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A Retrospective Study On Drug Utilization Pattern In Lower Respiratory Tract Infections In Pediatrics In Tertiary Care Hospital

Dr. G Anantha Lakshmi[1], Dr. Svs Sreedhar[2], Dr E Alice Melinda[3], K. Tushar Varma[4], M Siri Vennela[4], Soumya Jaiswal[4]

[1]*professor & Head, Department Of Pharm D, Sri Venkateshwara College Of Pharmacy, Madhapur, Hyderabad.*
[2]*pediatric Intensivist, Apollo Hospitals, Jubilee Hills, Hyderabad.*
[3]*assistant Professor, Department Of Pharm D, Sri Venkateshwara College Of Pharmacy, Madhapur, Hyderabad.*
[4]*pharm D Interns, Sri Venkateshwara College Of Pharmacy, Madhapur, Hyderabad.*

Abstract
Objective: *To identify the type of antibiotics prescribed for lower respiratory tract infections. To identify other anti-infective medications prescribed frequently in pediatrics & to analyze overall drug utilization patterns in lower respiratory tract infections in pediatrics.*
Methodology: *Was a retrospective observation study which was conducted on paediatric patients in tertiary care hospitals to assess drug utilization patterns in lower respiratory tract infections. A data collection form was designed and patient demographic details, microbial investigations done by the respiratory panel, and nasopharyngeal swabs and medication prescribed are recorded in the data collection form. With a sample size of 100 patients over a period of 6 months, we conducted a prospective observational study at a tertiary care hospital*
Results: *We found that, out of 100 patients involved in our study; 51% are boys and 49% are girls. The number of patients involved is 25% infants and 75% children. The investigations done are influenza AH3 33%, RSV positive 14%, parainfluenza virus 7%, metapneumovirus 2%, H1N1 influenza 11%, and rhinovirus/enterovirus 33%. Among all the paediatric patients diagnosed with pneumonia 27%, influenza was 36%, bronchiolitis 9%, and viral LRTI 28%. Bronchodilators used most are lev salbutamol + Budesonide 67%, Lev salbutamol 25%, budesonide 2%. Antibiotics used are 42% of amoxicillin clavulanate potassium, 34% ceftriaxone, and piperacillin/tazobactam 7%. The other drugs used are oseltamivir 50%, nasal drops 32%, chlorpheniramine maleate 14%, and Phenylephrine 12%.*
Conclusion: *We conclude that Drug utilization studies are important tools to highlight the prescribing trends in the hospital and drugs prescribed from the EDL will give a positive outlook to the prescribers and the patient outcome. This study gives a positive outlook on the utilization pattern of drugs with all the indicators specifically the Essential Drugs List, minimal use of antimicrobials, and generic prescriptions.*
Key Words: *Respiratory tract infections, pediatric, lev salbutamol, pneumonia, flu.*

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I. Introduction

Respiratory tract infections (RTIs) are among the most common and important problems in clinical medicine. In developed countries, acute respiratory infections (ARI) account for the majority of antibiotic prescriptions written, 20% of all medical consultations and over 30% of lost days from work [1]. The situation is even more dramatic in developing countries where nearly 20% of mortality in children under the age of 5 years can be attributed to ARI [2]. When a patient is thought to have a respiratory infection, considering the disease features in a sequential manner can help focus the differential diagnosis and expedite specific diagnosis and treatment. The starting point is a basic understanding of the pathophysiology of the respiratory tract and ways in which innate and acquired immune systems interact with microbial pathogens. The physician then defines the clinical syndrome being evaluated, the medical characteristics of the affected patient, and the context in which the infection was contracted. This information guides laboratory testing, imaging, and acquisition of other ancillary data needed to arrive at a final diagnosis and treatment plan. This chapter provides an overview of key concepts related to RTIs, with an emphasis on clinical and microbiological aspects.

Lower respiratory tract infection (**LRTI**) is a term often used as a synonym for pneumonia but can also be applied to other types of infection including lung abscess and acute bronchitis. Symptoms include shortness of breath, weakness, fever, coughing and fatigue.[3] A routine chest X-ray is not always necessary for people who have symptoms of a lower respiratory tract infection.[4] Influenza affects both the upper and lower respiratory tracts. Antibiotics are the first-line treatment for pneumonia; however, they are neither effective nor indicated for parasitic or viral infections. Acute bronchitis typically resolves on its own with time. In 2015 there were about 291 million cases.[5] These resulted in 2.74 million deaths down from 3.4 million deaths in 1990.[5][6] This was 4.8% of all deaths in 2013.[7]

A lower respiratory tract infection (RTI) occurs when there is an infection of the lungs, specifically in the lower airways. This infection is usually caused by a virus, but it can also be caused by bacteria or other less common organisms.

Common lower RTIs in infants and young children include:

- Flu. The flu (influenza) is a common viral infection that occurs most often during the winter months. It can be more dangerous to your health if you are very young or elderly.
- Viral Bronchiolitis. Bronchiolitis is an inflammation of the lining of the bronchioles (the very small passages through which air flows to and from the lungs). This condition is very common in infants and caused by several viruses, including respiratory syncytial virus (RSV).
- Pneumonia. Pneumonia is an infection that causes inflammation of the air sacs in one or both of the lungs. Its symptoms can range from mild to severe enough to require hospitalization.

The substantial decline in the burden of childhood community-acquired lower respiratory tract infections (LRTI) over the last decades is associated with improvements in immunization, nutrition, socioeconomic, and control of the HIV epidemic [(7)]. However, LRTI remains the commonest cause of under-5 mortality outside the neonatal period [(7)]. Although most children with LRTI fully recover, a proportion develops chronic respiratory symptoms and/or sequelae; reasons include host factors (immunosuppression, poor secretion clearance, airway abnormalities or genetic factors), infectious causes (TB or adenovirus), and/or adverse environmental factors. Early identification and management of children at-risk of respiratory sequelae may help to preserve long-term lung health. However, knowing who and when to investigate is challenging as there is little high-level evidence to support the timing and extent of investigations required.

According to world health organization (WHO) estimates, even more than 150 million episodes of community-acquired pneumonia and 2 million pneumonia-related deaths took place in the year 2008 amongst children under five years of age in creating countries. Of all pneumonia instances, 7-13% were sever enough to be life-threatening and necessary hospitalization [9]. To decrease the morbidity and mortality caused by pneumonia in youngsters below 5 years in resource-poor countries the WHO has developed a basic situation-management approach of acute respiratory infection (ARI) in the 1980s with early diagnosis of pneumonia and empirical antibacterial treatment [10].

The basis for the case-management program was that nearly all ARI-related death was caused by bacterial pneumonia. According to the protocol, pneumonia can be differentiated from other respiratory diseases by trained paramedical healthcare providers using basic medical signs in primary health facilities [11]. The WHO integrated the ARI instance- management standards right into the medical protocols of "The Integrated Management of Childhood Illnesses (IMCI)" and the program had been taken on by many establishing nations [12] . These guidelines consisted of referrals for the instance- management of acute childhood illnesses and guidance when referral to greater levels of care is needed. They specify appropriate anti-bacterial therapy and precautionary treatments against the leading reasons for youth mortality [13]. This strategy has been effective in reducing ARI- related mortality in kids below 5 years in developing nations [14]. Over time, to increase the specificity of the guidelines, the programs have advanced [15].

II. Materials And Methods

With a sample size of 100 patients over a period of 6 months, we conducted a retrospective observational study at a tertiary care hospital. We applied criteria to get the data for analysis

Inclusion Criteria:

In patients up to 12 years of age, diagnosed with lower respiratory tract infections.

Exclusion Criteria:

- Patients above 12 years of age.
- Children diagnosed with other complications.

We collected data

Study period: 6 months

↓

Study subjects were included and excluded as per inclusion and exclusion criteria

Review for 1.5, 3, 4.5, 6 months-followed up

↓

Result-applied statistics

↓

Result

III. Results And Discussion

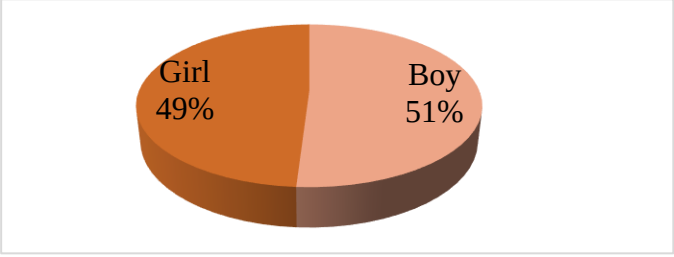
In our study we have collected 100 cases of lower respiratory tract infections in pediatric patients. Lower respiratory tract infection like influenza, pneumonia and bronchiolitis. As per inclusion and exclusion criteria these 100 cases were collected from medical research department. All these patients were prescribed antibiotics, antiviral drug. We have evaluated the collected data into various parameters based on gender, age, microbial investigations, types of LRTI, length of stay in hospital and management. In recent years, the studies on drug utilization have become a potential tool to be used in the evaluation of health care systems. Drug utilization studies used to analyze the different aspects of the use of drugs and to implement ways of improving therapeutic quality.

Table 4.1: Distribution of patients based on gender

Gender	No. of patients
Boy	49
Girl	51
Total	100

Table 4.1 explains the gender distribution in patients. The table illustrates that a total of 100 patients of lower respiratory tract infections included in our study; out of which 51% were boys and 49% were girls.

Figure 4.1: Pie chart showing the distribution of patients based on gender

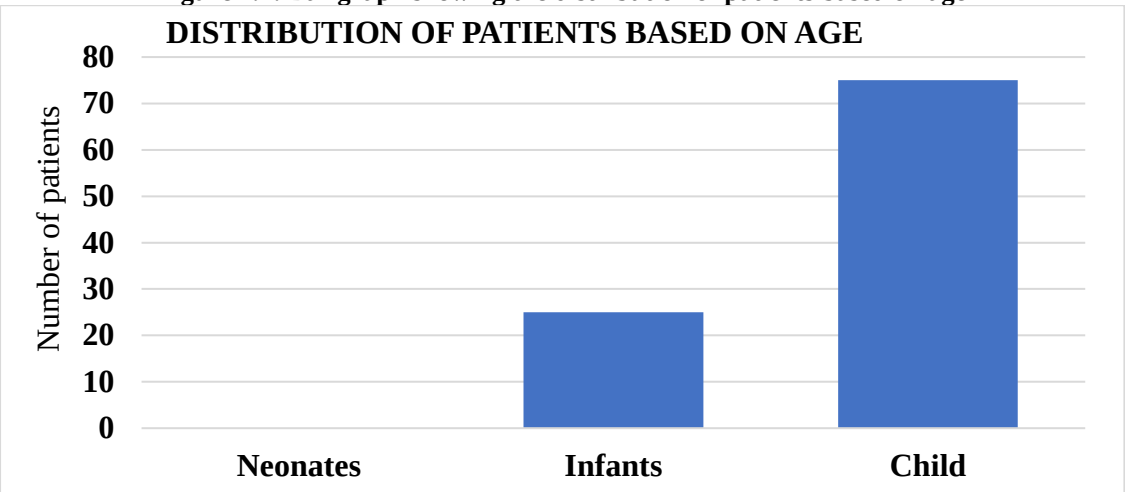


From the above pie chart, it is shown that almost both boys and girls are equally prone to lower respiratory tract infection.

Table 4.2: Distribution of patients based on age

Age	No. of patients
Neonates (Birth-1month)	-
Infants (1 month-1 year)	25
Child (1 year- 12 years)	75

Figure 4.2: Bar graph showing the distribution of patients based on age



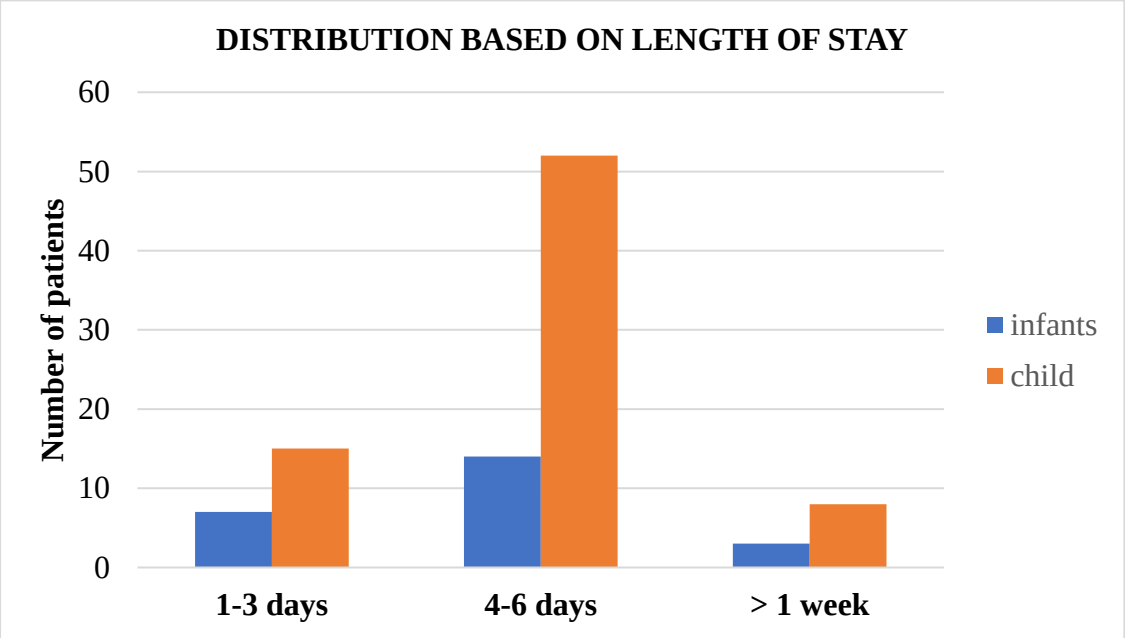
Infant and children represent a large part of the population. In our study the age of pediatric patient was from birth to 12 years. Figure 4.2 explains the age distribution in patients. The figure illustrates that the patients in neonates (birth to 1 month) were not found, in infants (1 month to 1 year) were 25% and in children (1 year to 12 years) were 75%.

From the above information it is shown that, in this study a greater number of children cases were observed compared to infants and neonates.

Table 4.3: Distribution based on length of stay

Length of stay	1- 3 days	4-6 days	> 1 week
Infant	7	14	3
Child	15	52	8

Figure 4.3: Bar graph showing distribution of patients based on length of stay in hospital



Above graph 4.3 represents distribution of patients based on length of stay of patients in hospital. Among 100 patients admitted with LRTI in pediatrics, 7% infants and 15% children stayed for 1-3 day, 14% infants and 52% children stayed for 4-6 days, 3% infants and 8% children stayed for >1 week.

From the above information it is shown that, in this study the average duration of hospital stay is 4-6 days, were more number of patients are children and duration of hospital for infants is at the lowest in 1-3 days, 4-6 days, > 1 week.

Table 4.4: Distribution of patients based on microbial investigations

Investigations	No. of patients
Influenza AH3	33
RSV positive	14
Parainfluenza	7
Metapneumovirus	2
H1N1 Influenza	11
Rhinovirus/ adenovirus/ enterovirus	33

Figure 4.4: Pie chart showing the distribution of patients based on microbial investigations

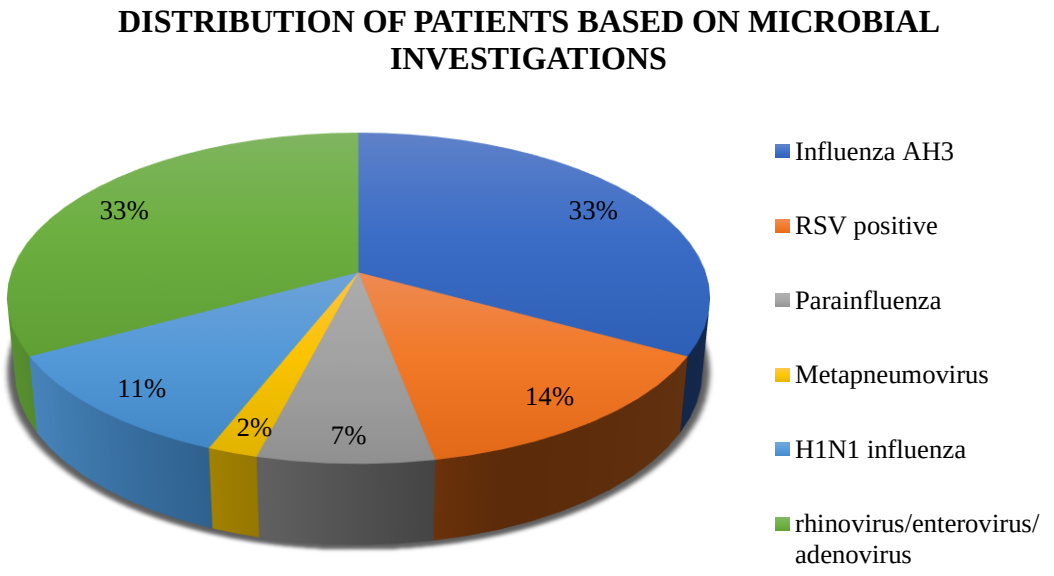


Figure 4.4 shows distribution of patients based on microbial investigations. This figure illustrates microbial investigations done when patient is admitted to hospital are respiratory panel and nasopharyngeal swab test which showed 33% influenza AH3,33% rhinovirus/enterovirus/adenovirus 33%, 14% RSV positive, 11% H1N1 influenza, 7% parainfluenza and 2% metapneumovirus.

In which the most common test done is Influenza AH3 and the second commonest test is rhinovirus/enterovirus/adenovirus.

Table 4.5: Distribution of patients based on types of LRTI

Disease	No. of patients
Pneumonia	27
Influenza	36
Bronchiolitis	9
Viral LRTI	28

Figure 4.5: Pie chart showing distribution of patients based on types of LRTI

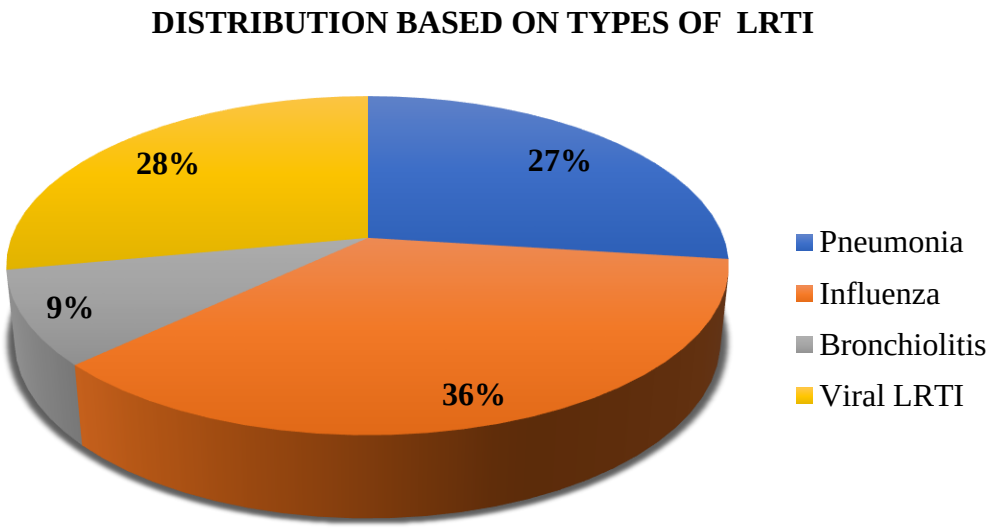
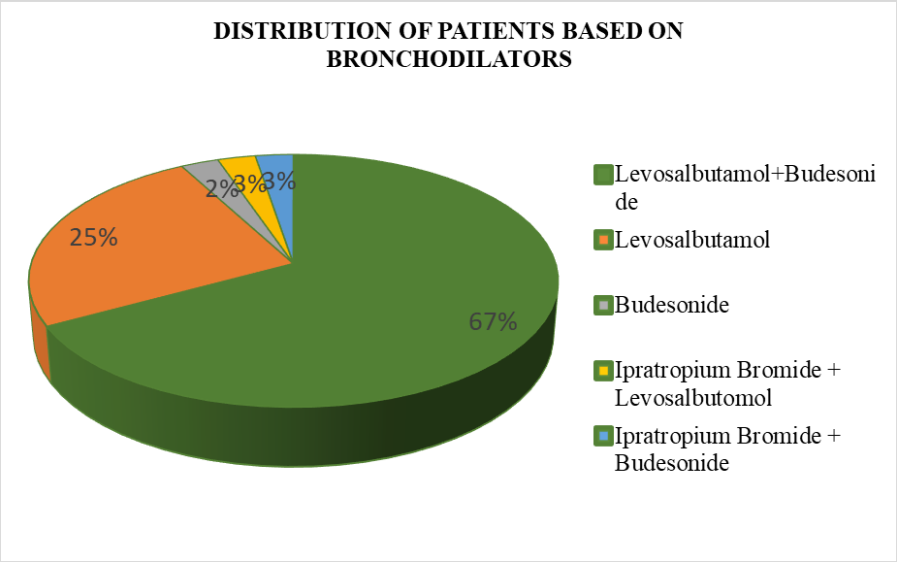


Figure 4.5 shows distribution of patient based on types of LRTI. In present study the most commonly diagnosed disease was influenza, which was found in 36 patients followed by viral lrti in 28 patients, then pneumonia in 27 patients and then bronchiolitis in 9 patients.

Table 4.6: Distribution of patients based on bronchodilators used in LRTI

Bronchodilators	No. of patients
Levosalbutamol+Budesonide	51
Levosalbutamol	19
Budesonide	2
Ipratropium Bromide + Levosalbutomol	2
Ipratropium Bromide + Budesonide	2

Figure 4.6: Distribution of patients based on bronchodilators used in LRTI



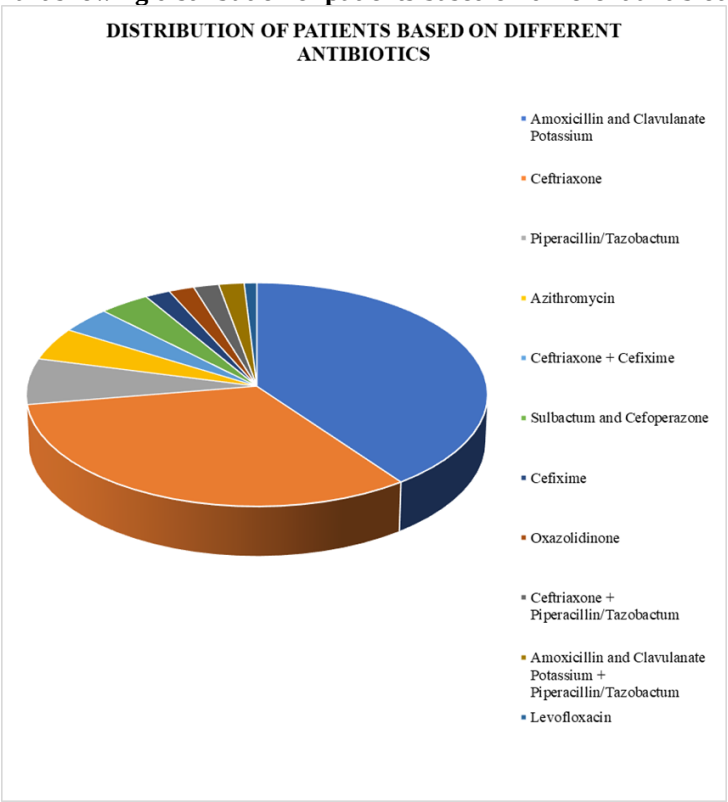
Above pie chart 4.6 represents distribution based on types of bronchodilators used in LRTI. Different formulations were prescribed in the present study, of which inhalation route, by this route it produce a rapid effect and provide sympyomatic relief. Budesonide with dose 0.5mg is the most used bronchodilator where as levolin is least used because it is prescribed to children above 6 years with dose of 0.63mg.

From the above figure we can state that Levosalbuatomol + budesonide 51% and levosalbutamol 19% were mostly common drugs used and 2% budesonide, 2% iptropium bromide + levosalbutamol were least prescribed drugs.

Table 4.7: Distribution of patients based on different antibiotics used in LRTI

Antibiotics	No. of patients
Amoxicillin and Clavulanate Potassium	42
Ceftriaxone	34
Piperacillin/Tazobactum	7
Azithromycin	5
Ceftriaxone + Cefixime	4
Sulbactum and Cefoperazone	4
Cefixime	2
Oxazolidinone	2
Ceftriaxone + Piperacillin/Tazobactum	2
Amoxicillin and Clavulanate Potassium + Piperacillin/Tazobactum	2
Levofloxacin	1

Figure 4.7: Pie chart showing distribution of patients based on different antibiotics used in LRTI



Antibiotics are among mostly commonly prescribed drugs. Pediatric patients require more attention while prescribing antibiotics in order to avoid resistance and adverse reaction. Single antibiotic therapy was prescribed in most prescriptions.

Figure 4.7 states the distribution of different antibiotics. In our study, according to antibiotics prescribed as per the diagnosis, amoxicillin + clavulanate potassium was most common antibiotic given.

Amoxicillin+clavulanate potassium is mostly prescribed with dosage 300mg-1.2g. ceftriaxone with dosage of 50mg-100mg/kg. Among cephalosporins, ceftriaxone was used in 34 patients and combination of ceftriaxone and cefexime in 4 patients. In our study there were no adverse reaction and drug - drug reaction.

Table 4.8: Distribution of patients based on other drugs used in LRT

Other drugs	No. of patients
Oseltamivir	50
Nasal drops	28
Chlorpheniramine Maleate	14
Phenylephrine	12
nasal spray	10
Ambroxol+Levosalbutamol+Guafenesin	10
Levodropizine Chlorpheniramine Maleate	6
Paracetamol	5
Montelukast	4
Domeperidone + Nasal Drops	4
Acebrophylline+Acetylcystine	3
Ondensetron	2
Prednisolone	2

Figure 4.8: Pie chart showing Distribution of patients based on other drugs used in LRTI

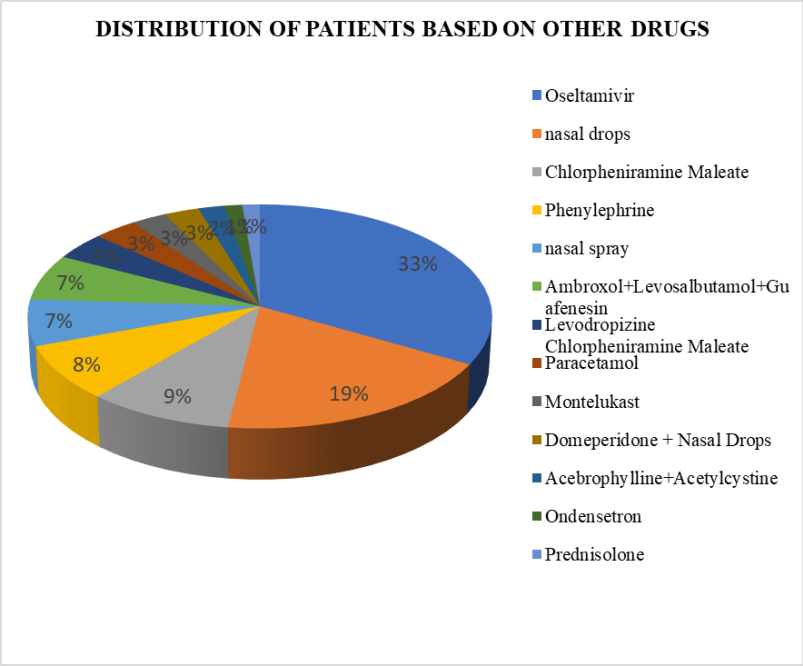


Figure 4.8 shows distribution of patients based on other drugs used in LRTI. Accordingly the most commonly other drugs been prescribed are Oseltamivir in 50 patients is most prescribed antiviral drug with dosage depending on their age and weight. Following with other drugs nasal drops in 28 patients, chlorpheniramine maleate 14 patients and phenylphrine in 12 patients.

IV. Conclusion

We conclude that Drug utilization studies are important tools to highlight the prescribing trends in the hospital and drugs prescribed from the EDL will give a positive outlook to the prescribers and the patient outcome. This study gives a positive outlook at the utilization pattern of drugs with all the indicators specifically Essential Drugs List, minimal use of antimicrobials and generic prescriptions. The misuse of antibiotics, especially in children can lead to bacterial resistance as well as various undesirable side effects associated with its use. As there was no immediate availability of culture and sensitivity report, there is always dilemma for prescribing an antibiotic. There is a need of educational programmes in order to bring rational use of antibiotics that requires development of standard guidelines for antibiotic prescription. It is also needed to create awareness in parents regarding the risk-benefit of antibiotics or other drugs for the self-limiting condition. The assessment of WHO core indicators and complementary indicators can help us decrease the cost burden on the patient. Continuous medical education with particular focus on rational drug usage and evidence-based medicine can further increase

the understanding. Regular clinical auditing can also help in improving the health care policies by the regulatory authorities.

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