



## STUDY ON ANTIBIOTICS USED IN PEDIATRICS PATIENTS WITH BACTERIAL PNEUMONIA – A RETROSPECTIVE SURVIELLENCE IN GCMCH

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### ABSTRACT

**Pneumonia**- a lower respiratory tract infection is the one which affects the lungs and is mainly caused by micro-organisms namely *Streptococcus pneumoniae*. Pneumonia kills children more than any other illness than AIDS, malaria and measles combined. Children under the age of 2 are at the highest risk for pneumonia. Almost everyone fully recovers with proper medical care. Pneumonia is treated with antibiotics (Second- or third generation cephalosporins and macrolide antibiotics such as azithromycin). A retrospective analysis was conducted to study the antibiotic usage in pediatric patients with pneumonia in the medical record department of government cuddalore medical college and hospital. The review of case sheets and treatment charts of pneumonia patients from January 2023 to December 2023 was done to collect the data pertaining to the study. The collected data was analyzed by the descriptive statistical analysis. In our study infants below 12 months of age were highly affected with bacterial pneumonia (male > female). Ceftriaxone was the most preferred antibiotic for bacterial pneumonia. Pediatrics patients who received therapy with cephalosporin derivatives (Ceftriaxone and cefotaxime) had the lower mean duration of hospital stay, less than 7 days.

**KEYWORDS :** Pediatrics; Pneumonia; Antibiotics.

### INTRODUCTION:

Pneumonia is an inflammation of parenchyma of the lungs. It is a lower respiratory tract infection caused by micro-organisms that specially affect the lungs. The lungs are made up of small sacs called alveoli, which fill with air when a healthy person breathes. When an individual has pneumonia, the alveoli are filled with pus and fluid, which makes breathing painful and limits oxygen intake. In each year approximately 2 million children under the age of five in developing countries die from pneumonia.

Pneumonia is classified based on causative agent into different types of bacterial pneumonia, viral pneumonia, fungal pneumonia. Anatomically, pneumonias may be classified as bronchopneumonia or lobar pneumonia. Bronchopneumonia occurs when infection leads to multiple discrete foci of consolidation within the lung, whereas lobar pneumonia is described when the area of consolidation is confined to the affected lobe which is diffusely involved. It also includes other types of, namely hospital acquired pneumonia, community acquired pneumonia, aspiration pneumonia.

Risk factors associated with pneumonia are low birth weight, malnutrition, and family history of bronchitis. Signs and Symptoms of pneumonia are fever, chills, cough, unusually rapid breathing, breathing with grunting or wheezing sounds, vomiting, chest pain and abdominal pain. Diagnosis of pneumonia can be done by complete blood count, cultures, imaging studies and cold agglutinin test.

X-ray imaging constitutes a non-invasive and relatively inexpensive examination of the lungs. The white spots in the pneumonic X-ray called infiltrates, distinguish a pneumonic from a healthy condition.

### Treatment:

Pneumonia should be treated with antibiotics based on etiology of the infectious organism, age, clinical status of the patients, history of exposure, possibility of resistance and other pertinent history. A retrospective study by Handy et al concluded that antibiotic choice for children with CAP found that 40.7% of the 10,414 children in the study (4239) received amoxicillin. However, 42.5% (4430) received macrolides, and

16.8% (1745) received broad-spectrum antibiotics. [1].

Another study by Williams et al found that there was an improvement at children's hospitals in the use of penicillin to treat pneumonia after the publication of the 2011 Pediatric Infectious Diseases Society/Infectious Diseases Society of America pneumonia guideline. Before the guideline was published < 10% of children's hospitals prescribed penicillin to treat pneumonia versus 27.6% following its publication [2]. Children with pneumonia usually benefit from guideline-based antibiotic therapy. Antibiotic stewardship programs are associated with a reduction in the use of broad- spectrum antibiotics.

### Antibiotic Agents:

Most of the children diagnosed with uncomplicated community-acquired pneumonia in the outpatient setting are treated with high-dose amoxicillin (first-line agent) which provides coverage for *Streptococcus pneumoniae*. Second- or third generation cephalosporins and macrolide antibiotics such as azithromycin are acceptable alternatives [3].

Macrolide antibiotics are useful in school-aged children, because they cover the most common bacteriologic and atypical agents such as *Mycoplasma*, *Chlamydia*, and *Legionella*

Hospitalized patients can be safely treated with narrow-spectrum agents such as ampicillin. Children who appear toxic should receive antibiotic therapy that includes vancomycin, along with second- or third generation cephalosporins.

A study by Williams et al reported no statistically significant difference in length of hospital stay between children hospitalized with pneumonia and those treated with a beta-lactam alone versus children treated with a beta-lactam plus a macrolide combination therapy.

Severe pneumonia is treated with Intravenous administration of antibiotics namely cephalosporins, penicillin and macrolides following other drugs, therefore pharmacists should be able to evaluate the management of such kinds of drug therapy.

**Prevention:**

Children can be protected from pneumonia through vaccinations. CDC recommends PCV15 or PCV20 for children younger than 5 years old. Most children receive 4 doses total, 1 dose at each of the following ages: 2 months, 4 months, 6 months, 12 to 15 months. Children who started with an earlier PCV called PCV13 can finish with PCV15 or PCV20.

**METHODOLOGY:**

Study site was hospital based and involves pediatric patients in the department of pediatrics at Government Cuddalore Medical College and Hospital [RMMCH] a 1250 bedded tertiary care teaching hospital located in rural South India, Chidambaram. Study Period involves 1 year [January 2023-December 2023] with a Retrospective observational study design. Proforma (Data collection form) was developed for the data collection purpose, from the records of Case sheets of pediatric patients with pneumonia in the medical records department of the Government Cuddalore Medical College and hospital. A total of 120 case records of pediatric patients with different types of pneumonia was observed.

Details of patients like demographic data, drug data, immunization history as per IAP, socio-economic status of patient's parents/caregiver were collected. Lab data: Chest X-ray, Hemoglobin and W.B.C count and Blood Culture report were also collected.

Drug data: Brand and generic name of all drugs prescribed mainly antibiotics, dose frequency, route of administration, duration of administration, monotherapy or combination therapy, duration of hospital stay was collected, and documented in a designed patients data collection form. The data was analyzed using a suitable statistical tool and Microsoft word and Excel have been used to generate graphs, tables to provide significant results.

**RESULT AND DISCUSSION:**

A total of 120 case records were analyzed.

**Age Wise Distribution Of Paediatric Patients With Pneumonia:**

**Table 1 Age wise distribution**

Age	Number	Percentage %
Below 12 months	58	48.3
1-3years	50	41.7
3-6 years	8	6.7
6-12 years	4	3.3

In our study 48.3% of pediatric patients were in the age group of below 12 months, 41.7% of patients were in 1-3 years of age, 6.7% of patients were in 3-6 years of age and the rest of the 3.3% of patients were in 6-12 years of age.

**Gender Wise Distribution Of Paediatric Patients With Pneumonia:**

According to gender distribution of patients, 80 male inpatients and 40 female inpatients were suffered from pneumonia.

**Table 2 Gender wise distribution**

Gender	Number	%
Male	80	66.7
Female	40	33.3

More male patients have greater susceptibility to pneumonia as compared to females (66.7% and 33.3%). Which was also found by James Stephen in his study at Tufts Medical School and New England Medical Center where it was reported that pneumonia incidence is greater in male patients than in female patients [4].

**Immunization History As Per Iap:**

**Table 3 Immunization history as per IAP**

Immunization	Number	%
Completely vaccinated	115	96
In completed vaccinated	5	4

Based on immunization history as per IAP (Indian association of pediatrics) 115 patients were completely vaccinated and 5 patients were incompletely vaccinated which was contradictory to the study conducted by Khaja Moinuddin, MA Altaf, Githa Kishore (Study of prescribing pattern of antibiotic in pediatric patients with pneumonia) [5].

**Chief Complaints In Paediatric Patients With Pneumonia:**

**Table 4 Chief complaints**

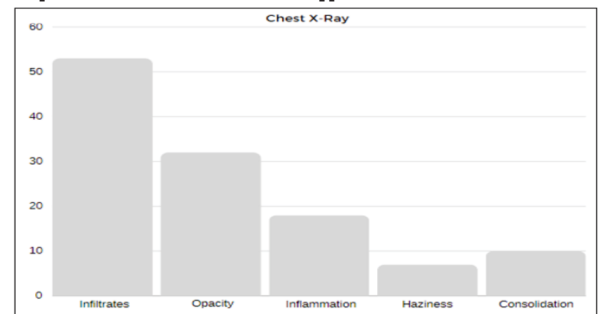
Complaints	Number of patients with multiple complaints
Cough and cold	73
Breathlessness	52
Fever	61
Sneeze and running nose	16
Wheeze	5
Vomiting	34
Nasal blockade	14
Respiratory distress	24
Others	45

From our study majority of patients are with the complaints of cough and cold, breathlessness, fever, running nose.

**Diagnosis Of Pneumonia:**

**Based on Respiratory examination:**

In our study most of the patients were observed with the common respiratory examination factors like both lung crepitus, SCR, ICR, wheeze, tachypnoea, and retractions.



**Based on Radiological examination:**

Most patients Chest X-Ray record shows infiltrates, opacity, inflammations, haziness, and consolidation in one or both lungs.

Different types of pneumonia diagnosed according to the respiratory and radiological examination includes Bronchopneumonia [47.5%], upper lobe pneumonia [21.7%], middle lobe pneumonia [12.5%], lower lobe pneumonia [15%] and others [3.3%].

**Table 5 Diagnosis of different types of bacterial pneumonia**

Diagnosis	Number	Percentage %
Bronchopneumonia	57	47.5
Upper lobe pneumonia	26	21.7
Middle lobe pneumonia	15	12.5
Lower lobe pneumonia	18	15
Others	4	3.3

**Management Of Pneumonia:**

**Table 6 Management of pneumonia**

Antibiotics administered both in monotherapy and combination therapy	Number of patients	Percentage %
Ceftriaxone	47	39.16

Cefotaxime	7	5.83
Piperacillin and tazobactam	16	13.33
Amoxicillin and potassium clavulanate	11	9.16
Ampicillin and cloxacillin	5	4.16
Gentamycin	8	6.66
Amikacin	7	5.83
Vancomycin	2	1.66
Azithromycin	9	7.5
Meropenem	4	3.33
Ampicillin	3	2.55
Doxycycline	1	0.83

In our study Ceftriaxone (39.16%) was the most preferred antibiotic. Other antibiotics administered were cefotaxime (5.83%), Piperacillin and Tazobactam (13.33%), Amoxicillin and potassium clavulanate (9.16%), Ampicillin and Cloxacillin (4.16%), Gentamicin (6.66%), Amikacin (5.83%), Vancomycin (1.66%), Azithromycin (7.5%), Meropenem (3.33%), Ampicillin (2.55%), Doxycycline (0.83%). 74.3% of the antibiotics were given in the intravenous route for the effective management of different types of bacterial pneumonia.

#### Duration Of Hospital Stay:

According to the antibiotics prescribed, we conclude that the patients who had received therapy with cephalosporin derivatives (ceftriaxone and cefotaxime) had mean duration of hospital stay less than 7 days.

#### CONCLUSION:

The present study assessed the prescribing pattern of antibiotics in pediatric patients with pneumonia was according to the IAP guidelines, which shows that the Beta lactams in parenteral therapy was most effective in the management of severe and non-severe pneumonia in children. For gram negative infections young infants should receive beta lactam and an aminoglycoside antibiotic. Prompt treatment of pneumonia is usually with a full course of appropriate antibiotics selection. Cephalosporin derivatives were selected because of its quick onset of action, rapid symptomatic relief, and minimal side effects. From our study, we observed that administration of cephalosporin categories of drugs (selectively ceftriaxone) reduced the duration of hospital stay which was effective in management of various types of bacterial pneumonia. Finally, the findings of our study helps in the rational use of antibiotics should be based on diagnosis and clinical manifestations of pediatrics patients with bacterial pneumonia.

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