



## RESEARCH ARTICLE

## Effect of Oxygen Requirement, Antimicrobial and Antiviral Drug Therapy in Various Respiratory Diseases

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### ABSTRACT

Pneumonia is the major cause for ARDs, identification of ARDs from the patients with pneumonia remains a significant clinical problem due to the overlap of clinical presentation and symptoms. The main aim is to study ARDs and Pneumonia treatment through antimicrobial drugs and antiviral drugs with oxygen support.

**Methods:** 38 Patients were taken for this study, studied on inpatients admitted to the hospital, on Physical examination and clinical diagnosis and various other diagnosis parameters Pneumonia caused by pathogens patients taken under consideration, those patients who develop severity during treatment of pneumonia and develops ARDs in ICU were studied. The investigation used a validated screening protocol to identify patients with ARDs (defined as a partial pressure of arterial Oxygen to fraction of inspired oxygen ratio < 300 mmHg and bilateral chest radiographic opacities without evidence of left sided heart failure), ABG test, and chest X-ray.

**Results:** This study enrolled 38 patients of pneumonia, out of these 26 patients Male and 12 females were identified, it reveals pneumonia is more prevalence in male instead of female. More than 50 years age are sensitive to pneumonia and treatment of pneumonia, in study found 65.79% patients of more than 50 years. Cough & fever are the most common symptoms which were present in pneumonia patients. As the diagnosis of physical and clinical investigation like chest X-ray, Sputum, pH, PaO<sub>2</sub>/FiO<sub>2</sub> ratio, describes the type of infection, and its severity. Sputum culture testing found 84.21% patients found gram positive from which 73.68% of the streptococcus pneumonia. Out of total patients 57.29% were smokers and 47.37 % were diabetic. For the treatment of pneumonia and ARDs various type of antibiotic injection in combination were prescribed along with Oxygen Support. Pneumonia patients are treated along with oxygen therapy which was provided through facemask at the flow of 5.0 L/min and FiO<sub>2</sub> is from 40% to 60% for ICU patients. The oxygen supply act as medicine as prescribing in both diseases. This Study include symptoms, etiology and treatment of n=38 patients of pneumonia. Out of total patients 15.78% have developed ARDS and treated accordingly.

**Conclusion:** For pneumonia treatment, diagnosis of pathogen has important role for antimicrobial or antiviral drug prescription, thus antimicrobial resistance will not develop and recovery will be faster. Oxygen support now a days used as medicine if required it must be prescribe. The patients oxygen saturation level and oxygen flow rate must be monitored.

ARDS cause is not properly identified but diagnosis in early stage and treatment with oxygen support, antimicrobials & antiviral drugs will be beneficial for recovery without mortality.

During covid 19 whole world has faced that many of patients who were suffered from pneumonia developed in to ARDS. The basic cause was not identified , physicians tried to recover with different drug therapies. That's why there is need of more study on ARDS diagnosis, cause and treatment.

**Key words:** ARDs, FiO<sub>2</sub> , pH,ICU,ABG,PaO<sub>2</sub>/FiO<sub>2</sub>

## Introduction

Acute respiratory distress syndrome and pneumonia are very similar in the critically ill inpatient. ARDS is caused micro-organism pathogens as well as by direct lung injury or Lungs infection. Pneumonia is a pulmonary infection, which is also being a cause of ARDS<sup>3</sup>. The prevalence of pneumonia during the course of ARDS seems to be particularly high,in those patients who are affected from ARDs are more susceptible to pneumonia<sup>4</sup>. In Severe ARDs and Pneumonia both are treated with antibiotics and Antiviral drugs. But not only Drugs gives recovery to the patients but also supplemental oxygen therapy may play its role in treatment<sup>2</sup>. Recent research suggests that Oxygen when medicated by physician it act as drug, also be to provide a prescribing pattern of drugs. To study the prescribed pattern of antimicrobial Drugs with oxygen supply and ventilator associated pneumonia and ARDs and their outcomes in Intensive care units (ICUs).<sup>5</sup> Antibiotics do not help in various lower respiratory infections which are caused by viruses. The treatment of bacterial pneumonia is selected by considering the age of the patient, the severity of the illness and the presence of

the underlying diseases<sup>1</sup>. Amoxicillin and doxycycline are suitable for many of the lower respiratory tract infections<sup>2</sup>. An acute illness of characterized by fever, productive cough with blood-stained sputum, signs of lobar consolidation and a neutrophilia has been considered diagnostic for streptococcus pneumonia infection<sup>8</sup>. The most predictors of patient morbidity and mortality are on age, disease caused by pathogens, presence of comorbidities. Patient over the age 60 have significantly higher mortality should be treated with hospitalization. For Pneumonia streptococcus pneumonia is more common in elder patients. It becomes more severe in case if the elder patients are also affected with diabetes mellitus, alcoholism, and congestive heart failure mental confusion<sup>1</sup>.

The patient with severe pneumonia can usually be recognized and required to hospitalized as soon as possible for special care as shown in table. The presence of two or more of the risk factors mentioned in the table lead to hospitalization, while those patients with one or less risk factors could be given a trial therapy.<sup>7</sup>

**Table No. 1: Guidelines for the diagnosis of severe pneumonia.**

<b>Guidelines for the diagnosis of severe pneumonia</b>	<b>Factors that predict a complicated course for community – acquired pneumonia.</b>
Respiratory rate > 30 min	Age > 65 years
Diastolic Pressure < 60 mmHg	Co-existent illness
Systolic Blood Pressure < 90 mmHg	Temperature > 38.3°C
Chest –X ray (shows presence of bilateral and multiple lobes)	Presence of immune suppression
White blood cell counts < 4or > 30 x 10 <sup>9</sup> /L	Aspiration, post –obstructive pneumonia, documented gram negative rod or Staphylococcus pneumonia.
PaO <sub>2</sub> < 60 mmHg	
PaCO <sub>2</sub> > 50 mmHg	
Confusion	
Shock	
Deterioration of renal function	

Acute respiratory distress syndrome is diagnosed by using 4 criteria, and its etiology can be differentiated into direct and indirect lung injury. The pathophysiology of pulmonary infiltrates in pneumonia is well defined, but the mechanisms behind the development of ARDs are still not fully understood<sup>1</sup>. The diagnosis of ARDs and pneumonia both require radiographic infiltrates; severe pneumonia is frequently of acute onset and shows bilateral infiltrates on chest radiography and severe acute respiratory failure not due to cardiac failure. Thus, it is virtually not possible to differentiate acute severe bilateral pneumonia from ARDs on clinical grounds alone. Pneumonia is the most frequent lung condition leading to ARDs. Sloane *et al.* reported pneumonia as the underlying etiology in 31% of all patients who developed ARDs and virtually all patients with ARDs require mechanical ventilation<sup>6</sup>.

#### Material & Method:

The Study was done in Sanjeevani Hospital & Research institute jaipur for 5 months on inpatients of ARDs and Pneumonia. This study was done on 38 Patients out of Which 6 patients are of ARDs and 38 patients affected from Pneumonia. This study was excluded from symptoms which are not related to ARDs and Pneumonia. Inclusion of those parameters which are related to pneumonia and ARDs. This study includes patients less than 40 years to more than 65 years. Only local patients were included from local hospital of the city. This Study was done from 2021 to 2022 to maintain uniformity in prescribing pattern of drugs by registered medical practitioner. The main aim of

this study was to assess the prescribing pattern of drugs and supply of Oxygen to the inpatients of ARDs and Pneumonia.

#### Statistical Methods

Data will be basis on drugs administration and their strength along with study chart of oxygen requirement in severe inpatients. Data will entered into M.S. Excel and analysis will be done by using statistical package for SPSS for windows Software.

The chi square test will be use to find the statistical difference between categorical variables among study groups and for continuous variable significant difference between mean & SD will tested by t test. P value < 0.05 will consider significant<sup>6</sup>.

#### Results and Discussion:

In the present observational Study, 38 patients of Community acquired Pneumonia were examined in 26 male inpatients and 12 female inpatients with an objective to evaluate the presence pneumonia. Oxygen supply in pneumonia and ARDs as per the guidelines of hospital to make the pattern of drugs prescription more effective and also to determine the effectiveness and safety of Oxygen therapy in the treatment. This study was carried out on age and gender basis, symptoms, co-morbidites, treatment by drug and Oxygen Supply along with their outcome.

In this Study, 65.79% patients found of more than 50 years age 34.21% patients of less than 50 years, in which patients of more than 50 years are more sensitive to Pneumonia. Fig.1

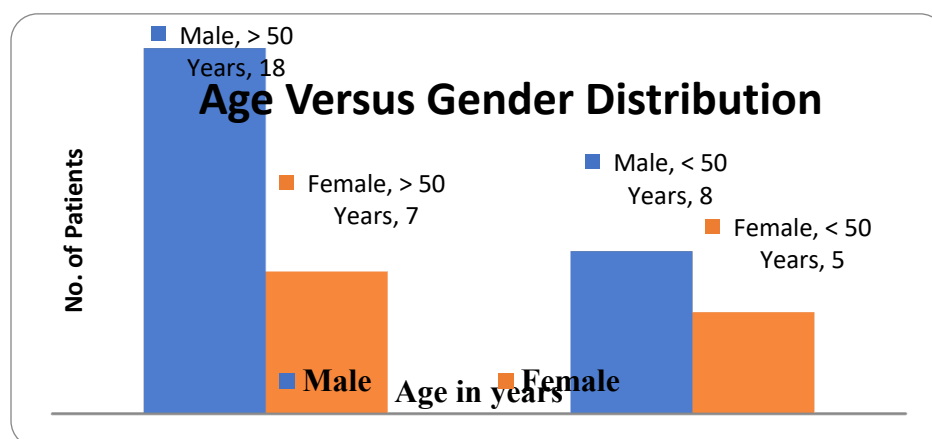


Fig.1: The age distribution of age versus Gender reveals that 18 (47.37%) male more than 50 years and 8 (21.05%) male are less than 50 years and 7 female 18.42% of more than 50 years and 5 female (13.16%) are less than 50 years. The P-Value 0.512 was non significant.

Pneumonia is confirmed through symptoms and their clinical manifestation, here cough and fever almost found in all patients, which implies that pneumonic patient have a major symptom of infection. 38 Patients were taken for this study in which 86.84% patients of both male and female were of cough and 97.36% Patients found suffered from fever. There are other symptoms also in the patients like chest congestion or chest pain, breathlessness, haemoptysis and loss in weight. It is tried to find correlations between such as clinical examination, recorded prior to chest X-ray. 38 patients were taken for pathogen study, in which 28 (76.68%) patients found infected from *Streptococcus pneumoniae* whereas *klebseila* and *staphylococcus* infected 2(5.26%) patients of each, 3(7.89%) Patients infected from *pseudomonas* and only 1(2.63%) Patient of *Candida albicans* were found infected. These infected patients were confirmed on the basis of pathogenic Culture testing.

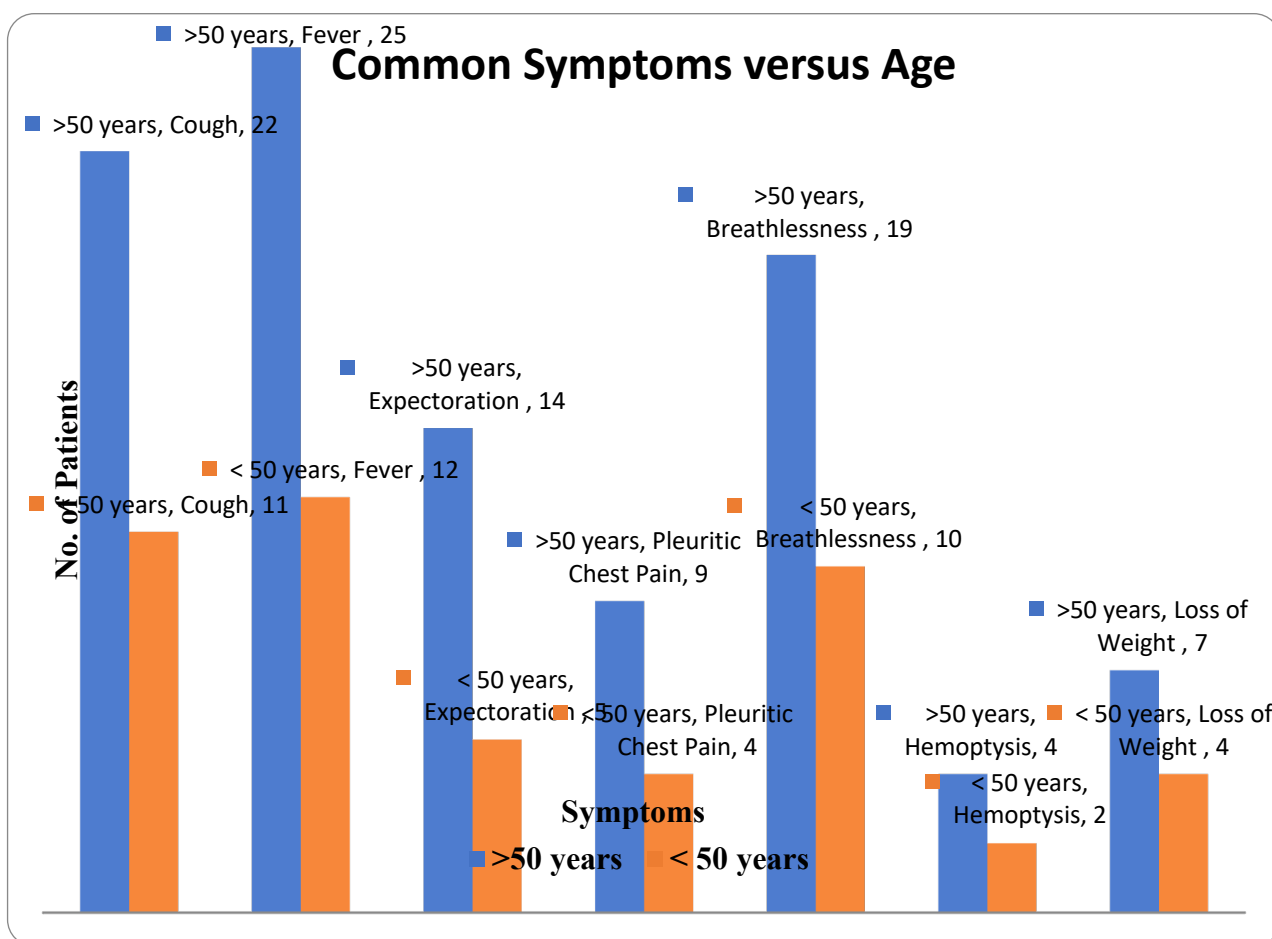
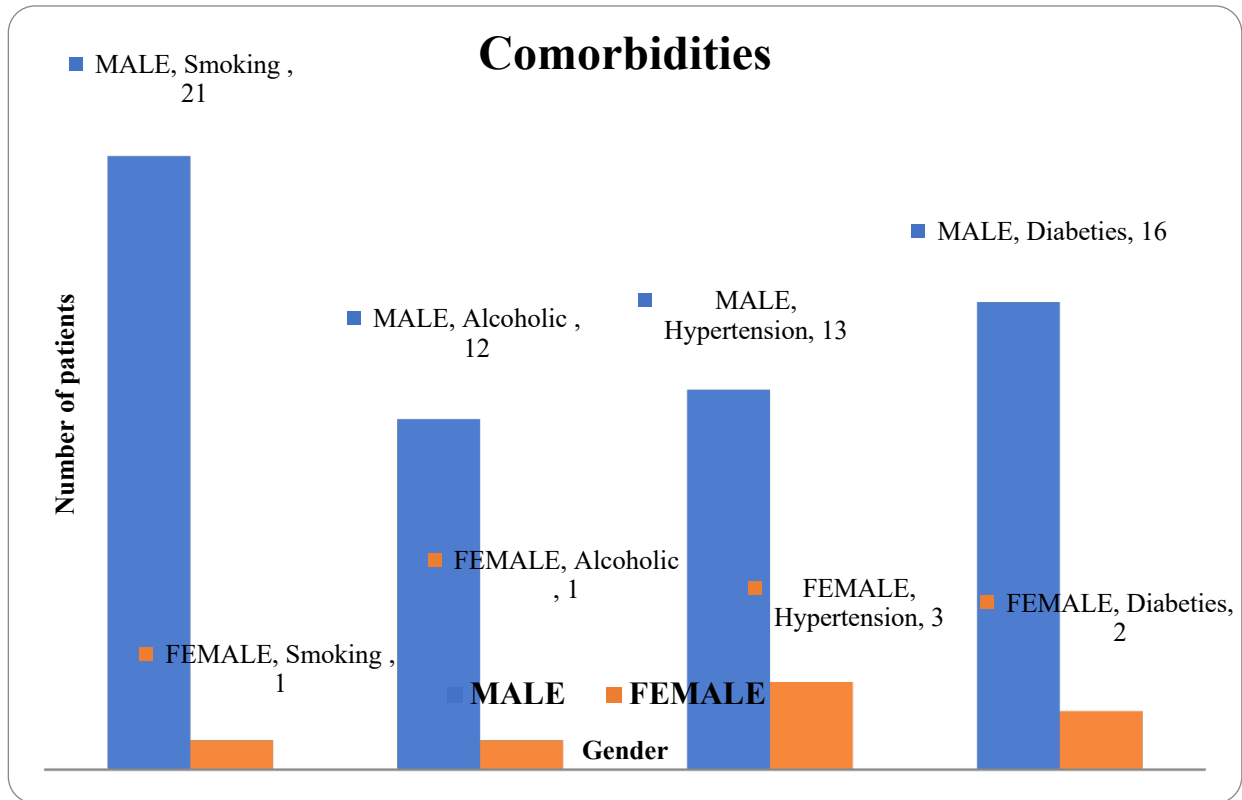


Figure 2: The common symptoms found in patients of pneumonia.

In Chest right lower lobe of 31.57% patients were at risk, Thus presence of fever and cough along with pathogens suggest pneumonia infection, while chest X-ray examination confirms the increase of infection in lungs. In consolidated CT Scan of Chest 36.84% of the patients were found infection in bilateral lobe and 31.57% were found infection in right lower lobe region of lung CT scan. In right upper lobe 5.26% of inpatients and 23.68% inpatients of left lower lobe, Left upper lobe 2.63% found infected.



**Figure 3: Co-morbidities in pneumonia**

Smoking patients 55.26% male and Patient 2.63% female ; Alcoholic patients 31.58% male; female patients 2.63%; Hypertension Patients 34.21% male; Patients 7.89% female; Diabetes 42.11% male, Patients 5.26% female.

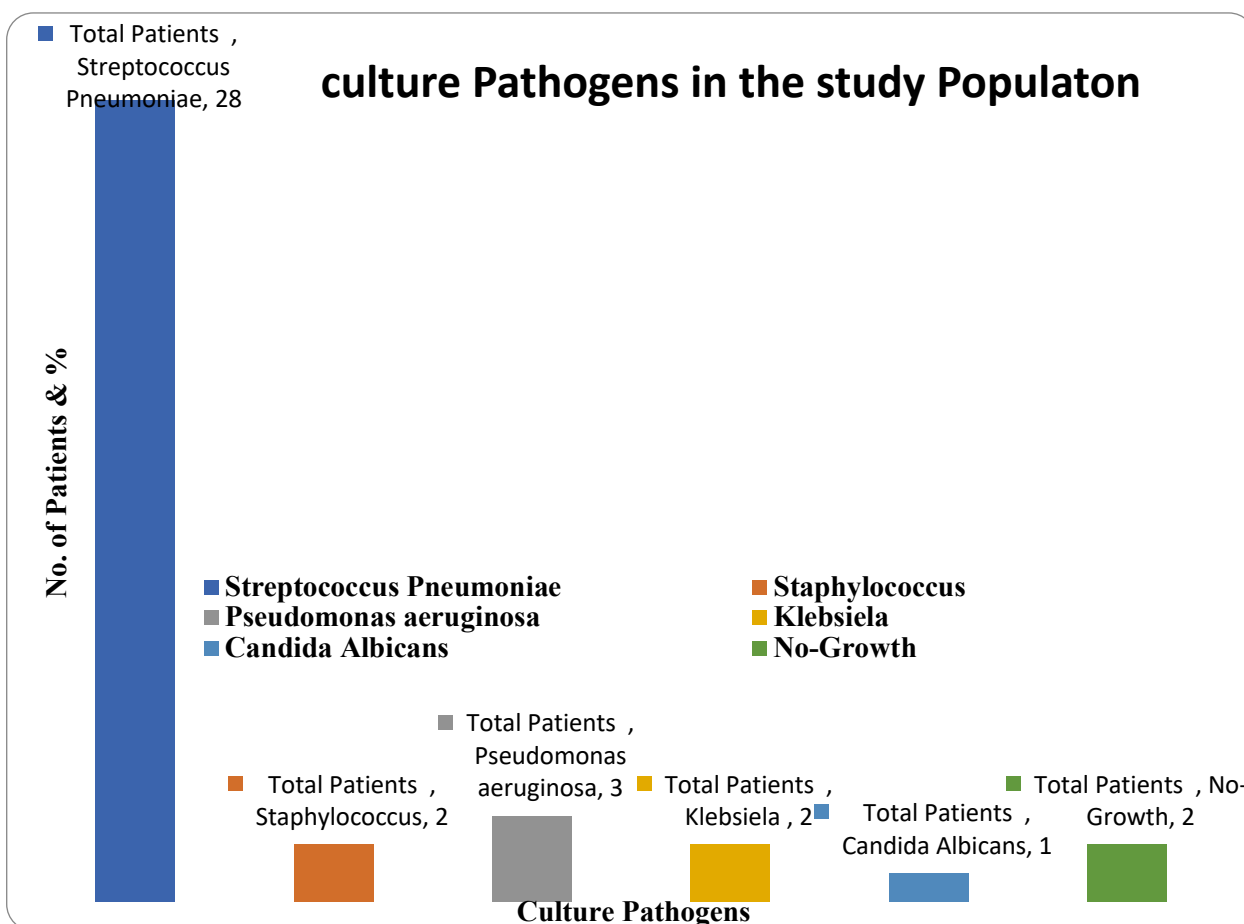
There is independent dose response is seen in patients associated with cigarette smoking in ARDs patients. This prediction can be explained as that cigarette smokers develop acute precipitating factor of ARDs like pneumonia, sepsis syndrome etc. In addition to the effect medicated through precipitating factors, smoking cause alveolar damage and thus directly contributes to respiratory insufficiency and ARDs. There is correlation found between alcohol consumption and ARDs in this study.

However another review put forth that history of chronic alcohol abuse is associated with increased incidence and severity of ARDs in critically ill patients. Alcohol abuse alters lung structure and function making lung susceptible

to edematous injury in presence of inflammatory stress<sup>7</sup>.

In earlier by Koh GC, Vlaar AP, Hofstra JJ et.al. found that diabetic was not associated with development of ARDs in an selected ICU patients<sup>8</sup>.

There are three causes of pneumonia as bacterial, viral and fungal infection were found . Bacterial Pneumonia found in 65.79% male inpatients and 26.32% female inpatients. Viral pneumonia 2.63% male and 2.63% female patients were found. 2.63% female patient found of Fungal infection. The patients isolated with 73.68% streptococcus pneumonia and 5.26% staphylococcus pneumonia, 5.26% Patients of Klebsiella pneumonia were prescribed with the combination of drugs. Amoxicillin & Potassium Clavulanate Injection, Azithromycine injection, Ceftriaxzone injection. Ceftriaxzone Injection with Meropenem injection were used inpatient who are associated with diabetes.



**Figure 4: Culture pathogens versus Number of patients**

In this Study, the diagnosis of pneumonia accounted for 38 Patients, and analyzed pneumonia in 100% of the total Cases. Further it was noted that majority of the pneumonia patients were reported above the age of 50. When the prescription were observed thoroughly, found that combination of drug were prescribed. Most of the drug was prescribed by the brand name instead of generic drug. Generic prescription which may enhance the better inventory control of the hospital Pharmacy; by prescribing generic drugs reduce the confusion of pharmacist during dispensing. Generic drug may reduce cost of burden on patient treatment.

**Table 1: Outcome of Treatment in Pneumonia**

Outcome parameters	No. of Patients	Avg Duration of Treatment (days)	Recovered	Recovered with AMA	Not Recovered
Patient with Drug	21	8	16	5	0
Patient with Drug & O <sub>2</sub> Support	17	9	5	6	6

Outcome of the pneumonia Results reveals that 16 Patients those who are treated with drug regimen are recovered within 8 days. Out of 21 patients, 5 patients were discharged against medical Advice. In ICU 17 Patients were treated with drugs and oxygen supply , 5 patients recovered within 9 days while 6 Patients are recovered and Discharged against medical Advice. From these 6 Patients were not recovered.

Six patients who were not recovered under gone for clinical test parameters like chest X-ray,chest CTand ABG test. These all 6 Patients were above the age of 50 years; out that 16.66% patients was female and 83.33% male patients.



**Table 2: Age Distribution of ARDs Patients**

Age Distribution of ARDs Patients				
S. No.	Age	Male	Female	Total
1	> 50	5	1	6
2	< 50	0	0	0
	Total	5	1	6

Antimicrobial drugs prescribing data are included for a suspected of confirmed ARDs and Pneumonia Patients, Day of therapy, duration of therapy, antimicrobial drugs prescribed for respiratory disease patients is 14 days of the testing date were reported. The data of the subject was collected till discharge. Distribution of Antimicrobial and Antiviral drugs prescribed during treatment as given in Table 4.

**Table 4: Drug Distribution of Antimicrobial Drugs and Antiviral Drugs**

S.No.	Name of Drugs	Number of Patients	Percentage
1	Moxifloxacin Injection	16	42.10
2	Ciprofloxacin injection	3	7.89
3	Azithromycin Tablet	13	34.21
4	Amoxicillin & Clavulanic Acid Injection	26	68.42
5	Ceftriaxzone Injection	3	7.89
6	Cefotaxime Injection	1	2.63
7	Piperacillin & Tazobactam Injection	2	5.26
8	Meropenem Injection	7	18.42
9	Teciplanin Injection	6	15.78
10	Acyclovir Injection	1	2.63
9	Fluconazole Injection	1	2.63

Oxygen Supply is used as drug prescription in ARDs and Pneumonia Patients, There are various types Oxygen Supply Devices are used with Different flow rate and PaO<sub>2</sub> Value like Face mask. Administration of Oxygen as drug for 72 hours in ARDs and 48 Hours in Pneumonia is required to heal the injured lungs and infected lungs. PaO<sub>2</sub>/FiO<sub>2</sub> ratio is essential for measure the Oxygen Level in Both Patients. Long term use of oxygen may become hazardous to the patients so it is one of the most important parameter to heal the lungs.

### Conclusion:

For pneumonia treatment, diagnosis of pathogen has important role for antimicrobial or antiviral drug prescription, thus antimicrobial resistance will not develop and recovery will be faster. Oxygen support now a days used as medicine if required it must be prescribe. The

patients oxygen saturation level and oxygen flow rate must be monitored.

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