

Spectrum of Respiratory Distress in PICU at a Tertiary Care Centre: A Cross Sectional Study

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Abstract: ***Introduction:** The most frequent basis of admission to PICU is respiratory distress. Oversight admissions and their outcomes becomes crucial since they may help to change practices as necessary to enhance patient outcomes. Analysing the incidence, causes and outcomes of patients admitted to the picu was the main objective of the study. **Methodology:** This retrospective cross - sectional study was conducted in a tertiary medical hospital in Ahmednagar district, from March - 22 to March - 23. Data of all children presenting with respiratory distress was collected from hospital records and analysed. Etiologies of the PICU patients were analysed according to various age groups. **Result:** A total of 250 patients with respiratory distress were studied during the study period. Pneumonia was found to be the most common cause of respiratory distress. Other causes seen were bronchiolitis, sepsis, etc. Mortality rate was high in infants below 1 year of age. **Conclusion:** Various etiologies of respiratory distress were discovered during this study. A special emphasis must also put on the importance of community health education to prevent the occurrence of this diseases.*

Keywords: Bronchiolitis, children, pneumonia, respiratory distress

1. Introduction

The most challenging and important part of paediatrics remains to be delivering care for children with serious illnesses. The level of expertise and competence of the medical staff, access to resources, and use of evidence - based management procedures all serve a role in providing the best care attainable in the paediatric intensive care unit.

The primary goal of paediatric critical care is not only to minimize mortality, but also to return a child who is suffering from a life - threatening condition to health with minimal pain, worry, and complications as achievable, in addition to provide relief and direction to the child's family.⁽¹⁾

The objective was to study the spectrum of respiratory distress in paediatric critical care unit (PICU) at a tertiary care centre in Ahmednagar district of Maharashtra.

2. Literature Survey

Respiratory distress is a severe inflammatory illness featuring decreased lung compliance, tachypnoea, and severe hypoxemia as a result of increased vascular permeability, protein rich edema, diffuse alveolar infiltration and loss of aerated lung tissue.

Mild, moderate and severe are the different levels of the severity of respiratory distress. The prognosis is poor for patients with moderate to severe distress who require invasive mechanical ventilation.

3. Problem Definition

In patients admitted to critical care units (ICUs), respiratory distress has a high morbidity and mortality rate, and its pathophysiology is typically connected to acute injury and inflammation in the lungs as a result of intra - or extrapulmonary causes.

Regardless of modern health - care facilities and a variety of health initiatives implemented by governments and policymakers each year, the present worldwide scenario of under - five mortality is concerning. In 2015⁽²⁾, approximately 5.9 million infants under the age of five perished, amounting to 16, 000 deaths per day. These are the numbers provided by WHO's global health monitor data. Pneumonia accounted for 13% of postnatal fatalities (1 - 59 months), gastroenteritis 9%, and malaria 5%.

By providing basic paediatric intensive care services such as intravenous access and fluid resuscitation, basic antibiotic support, oxygen and non - invasive ventilator support one can save the lives of million children every year.

4. Materials and Method

This was a retrospective cross - sectional study conducted in PICU of a tertiary care centre at Dr. Vitthalrao Vikhe Patil Foundations hospital, Ahmednagar from March 2022 to March 2023. The hospital is an accredited residency training centre and operates a well - equipped fifteen - bed modern PICU (with an isolation room), which admits paediatric patients 18 years of age, from both medical and surgical subspecialties.

Records in PICU were used as the source of data.

The data regarding the admission details, transfer outs, discharges and deaths was collected. All the patients suffering from respiratory distress were taken into consideration. Data was collected in the following format:

Demographic details: age, gender, Date of admission. Clinical data which included provisional diagnosis, previously diagnosed chronic conditions and outcome. The outcome including duration of stay, referral to general wards, discharges and death were also noted. For age analysis, the age groups were divided as follows - less than 1 year, 1 - 10 years, more than 10 years.

Data was analysed using Microsoft Office Excel version 2007 and entered in Statistical Package for Scientific Solutions (SPSS) version 16.0 spreadsheet and analysed. For the purpose of describing continuous variables, means, standard deviations, percentages, and ranges were used where applicable.

The study was conducted after the permission from the Institutional Ethical Committee (IEC).

5. Results

During the 1 - year period of study, total 250 patients with respiratory distress were admitted in PICU.

Of them, 133 (53.2%) were males and 117 (46.8%) were females, giving a male: female ratio of 1.13: 1. (Table 1)

Table 1: Gender distribution

| Gender | Frequency | Percentage |
|--------|-----------|------------|
| Male | 133 | 53.2 % |
| Female | 117 | 46.8 % |
| Total | 250 | 100% |

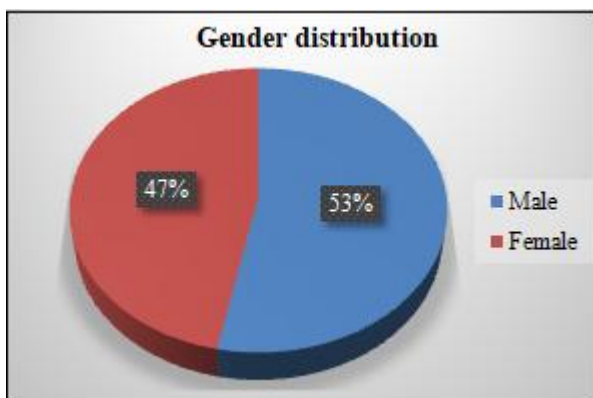


Figure 1: Gender distribution

Their ages ranged from one month to 15 years. Out of the total 133 males, 67 were infants less than 1 year of age, 42

were children between age group 1 - 10 years and 24 were children of age group >10 to <15 years of age.

Out of total 117 females, 52 were infants less than 1 year of age, 31 were children between age group 1 - 10 years and 34 were children of age group >10 to <15 years of age. (Table 2)

Table 2: Age Wise Distribution

| Variables | Age Groups | | |
|-----------|------------|--------------|----------------|
| | <1year | 1 - 10 years | >10 - <15years |
| Male | 67 | 42 | 24 |
| Female | 52 | 31 | 34 |
| Total | 119 | 71 | 58 |

Respiratory causes leading to distress was the most common cause seen. Pneumonia was the most common cause contributing 35.6%.

Other causes of distress were sepsis (8.4%), bronchiolitis (7.6%), severe anaemia with CCF (6.4%), bronchial asthma (6%), metabolic acidosis (4.4%), arterial septal defect (4%), empyema (4%), rheumatic heart disease (3.6%), ventricular septal defect (3.2%), patent ductus arteriosus (2.4%), pleural effusion (2.4%), raised intracranial tension (5%), pneumothorax (2%), acute laryngotracheobronchitis (2%), pulmonary edema (1.6%), foreign body obstruction (1.6%), TOF (0.8%), laryngomalacia (0.8%), obstructive emphysema (0.4%), GBS (0.4) (Table 3)

Table 3: Etiologies of respiratory distress

| Diseases | Male | Female |
|--------------------------------|------|--------|
| Pneumonia | 47 | 42 |
| Sepsis | 12 | 9 |
| Bronchiolitis | 11 | 8 |
| Severe anaemia with CCF | 6 | 10 |
| Bronchial asthma | 7 | 8 |
| Metabolic acidosis | 5 | 6 |
| Arterial septal defect | 4 | 6 |
| Empyema | 4 | 6 |
| Rheumatic heart disease | 6 | 3 |
| Ventricular septal defect | 5 | 3 |
| Patent ductus arteriosus | 4 | 2 |
| Pleural effusion | 4 | 2 |
| Raised TCT | 3 | 2 |
| Pneumothorax | 3 | 2 |
| Acute laryngotracheobronchitis | 3 | 2 |
| Pulmonary edema | 2 | 2 |
| Foreign body obstruction | 2 | 2 |
| Tetralogy of Fallot | 2 | 0 |
| Laryngomalacia | 2 | 1 |
| Obstructive emphysema | 1 | 0 |
| Gullein Barre Syndrome | 0 | 1 |
| Total | 133 | 117 |

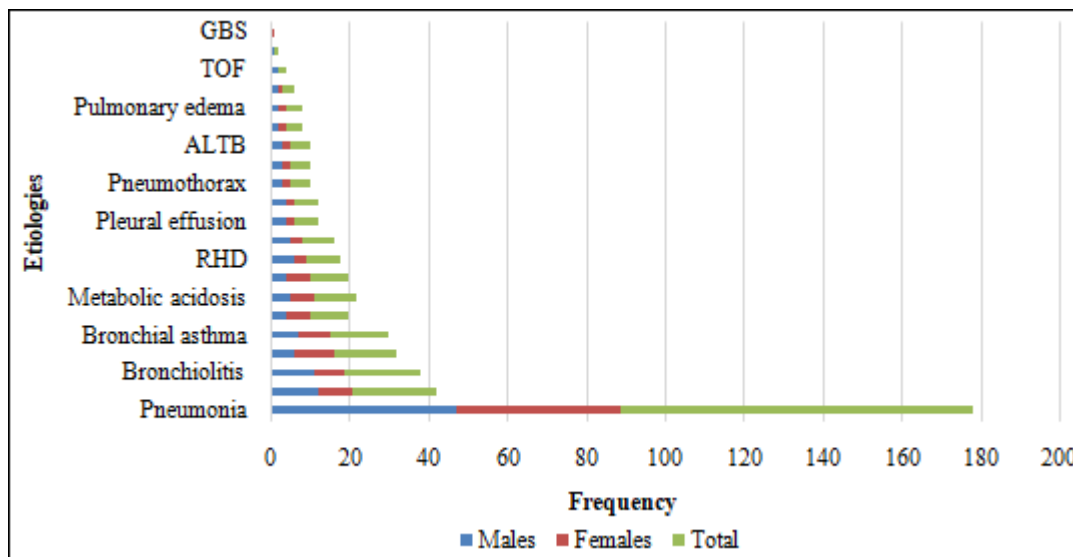


Figure 2: Relationship between etiology of admissions and gender

Regarding the clinical outcome patients improved, were transferred to the paediatric ward, and were eventually discharged; patients died; left against medical advice (DAMA). We observed a mortality rate of 12%. Mortality was high in infants. (Table 4)

Table 4: Outcome of admitted patients

| Outcome | No. of patients | Percentage |
|---------------|-----------------|------------|
| Transfer outs | 72 | 28.8% |
| Discharges | 116 | 46.4% |
| DAMA | 32 | 12.8% |
| Death | 30 | 12% |
| Total | 250 | 100% |

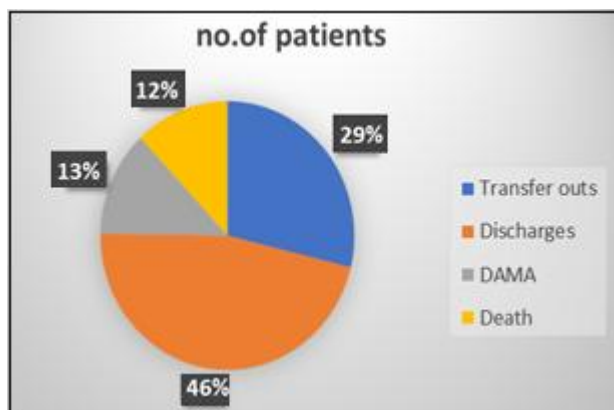


Figure 3: Outcome of admitted patients.

6. Discussion

At our PICU, critically ill infants, children, and adolescents up to age 14 receive round - the - clock supervision, monitoring, and specialised therapy. The need for modern machinery is one of the criteria for being admitted to the unit. This includes support such as mechanical ventilation and/or invasive monitoring. (3) Furthermore, it comprises post - surgical patients in need of critical care who are critically ill but still treatable and who require care beyond what is provided in the normal wards.

Children less than 1 - year of age were the most vulnerable group, who presented to the emergency department requiring admission to the PICU, 119 (47.6%). This was similar to that reported by Rady, (4) Einloft et al. (5) (40%), and Lanetzki et al. (6) In our study, males constituted 53.2% of admission (133), it was similar to that reported by Batista et al. (7) (56%) and Einloft et al. (8) (58%).

According to the etiologic analysis in this study, diseases of the respiratory system (pneumonias, bronchiolitis) and sepsis were both the major etiologies in patients with ICU admission. The result is similar to a previous study in which disease of the respiratory system was the major cause (9, 10) but is not comparable with another study in which the major etiology was disease of the cardiovascular system (11). Even so, pneumonias made up the majority of PICU admissions across all age groups.

In contrast to the general and polytrauma cases reported by Abhulimhen - Iyoha et al (12) and Batista et al. (13) we hardly had any cases of trauma.

According to our results, infant mortality was relatively high. The observed mortality rate in our study was less (12%). This observation was in contrast to that reported by Abebe et al. (14) (40%). Important factors that may have contributed to survival in these patients include adequate manpower, equipment, and provision of continuous medical education in paediatric critical care from time to time for staff by the institution.

7. Conclusion

Several aetiologies for admission are discovered by the study of the patterns of patients admitted to PICU; respiratory system diseases were among the most common aetiologies. Pneumonia was the most common cause of respiratory distress which was followed by bronchiolitis and sepsis.

8. Future Scope

In a trial, new protocols must be made available to providers in order to enhance the prognosis of infants' illnesses and shorten the length of stay for pneumonia patients. Besides that, the cost effectiveness would improve. In order to plan health policies that would mitigate various factors related to the evolution of diseases prevalent in these sectors, knowledge of the clinical spectrum and epidemiological profile of critically ill children is essential. Also, we would want to emphasise the importance of community health education and public health prevention methods, which must be promoted, particularly in rural India and isolated areas.

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