Original Article

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Clinical Profile and Outcome of Moderate to Severe Acute Respiratory Distress Syndrome in a Paediatric Intensive Care Unit of Eastern India: A Prospective Cohort Study

Paediatrics Section

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ABSTRACT

Introduction: Paediatric Acute Respiratory Distress Syndrome (PARDS) remains a major cause of mortality and morbidity in Paediatric Intensive Care Units (PICU) despite various advanced management strategies. The management and outcome of PARDS depend on the severity of the disease.

Aim: To study the clinical profile in terms of aetiology and outcome of paediatric patients with moderate to severe Acute Respiratory Distress Syndrome (ARDS) in the PICU.

Materials and Methods: A prospective cohort study was conducted at the PICU in Dr. B C Roy Postgraduate Institute of Paediatric Sciences, Kolkata, West Bengal, India, from July 2018 to June 2019. A total of 120 children aged between two months and 12 years who developed moderate to severe ARDS according to Paediatric Acute Lung Injury Consensus Conference (PALICC) criteria were included. Demographic details, different risk factors, morbidity patterns, and outcomes were recorded. Patients were categorised into three groups based on Positive End Expiratory Pressure (PEEP): 5-8 cm of H_2O, 9-12 cm of H_2O, and >12 cm of H_2O. Based on Peak Inspiratory Pressure (PIP), patients were divided into two groups: <30 cm of H_2O and 30-35 cm of H_2O. Data were statistically analysed using the Chi-square test, Fisher's test, and t-tests where applicable.

Results: Out of a total of 120 children with moderate to severe ARDS, there were 75 males and 45 females. Direct lung injury accounted for 79 cases (65.5%), while indirect lung injury occurred in 41 cases (34.5%). Pneumonia and sepsis were the most common causes of direct and indirect lung injury, respectively. Among 75 cases of pneumonia, 40 deaths were reported (53.3%), and out of 37 cases of sepsis, 31 resulted in death (83%). On the day of admission, 38.3% of cases were classified as moderate ARDS and 61.7% as severe ARDS. The mortality rate for severe ARDS was 77%, compared to 43.5% for moderate ARDS. The mortality rate was 100% in the PEEP max >12 cm of H_2O group and 84.4% in the PIP 30-35 cm of H_2O group.

Conclusion: The majority of ARDS cases are due to direct lung injury caused by pneumonia, and the outcome is better than in cases of indirect lung injury. Mortality is nearly twice as high in severe ARDS as in moderate ARDS.

Keywords: Direct lung injury, Hypoxemia, Pneumonia, Sepsis

INTRODUCTION

ARDS is defined by pulmonary oedema, atelectasis, and severe ventilation/perfusion (V/Q) mismatch which leads to hypoxaemia and hypercapnia [1]. ARDS is a clinical syndrome caused by the disruption of the alveolar epithelial-endothelial membrane, not due to cardiogenic pulmonary oedema. There is an accumulation of protein-rich fluid in the alveoli with inflammation and coagulation, resulting in impaired lymphatic drainage as well as the destruction of surfactant. Ultimately, this leads to a restrictive lung disease with hypoxaemia, parenchymal opacities in radiographs, increased physiological dead space, decreased functional residual capacity, and decreased lung compliance. If the patient survives, the lung heals by fibrosis in a few weeks [2].

In some studies, ARDS has been described as adult respiratory distress syndrome, but it is now a well-known entity in children [3,4]. The definition of ARDS is gradually evolving from its first description in 1967 [5]. The American European Consensus Conference (AECC) definition was published in 1994 [6]. Berlin's criteria [7] to diagnose ARDS came into action in 2012, and finally, the PALICC group made a recommendation for the paediatric population [8]. The guidelines by PALICC broadened the criteria in 2015 by including pulse oximetry as the paucity of invasive blood gas analysis may underestimate the actual number of PARDS [8].

The common causes of PARDS are viral respiratory tract infections, pneumonia, sepsis, aspiration, shock, burns, inhalational injury, transfusion-related massive lung injury, and traumatic injury. All of these factors lead to inflammation in the lungs, increased vascular permeability, and pulmonary oedema affecting oxygenation [9]. Acute pancreatitis, envenomation, drowning and submersion injuries, drug reactions, malignancies, and transplantation are some other causal factors for ARDS [2].

The most common cause of death in the PICU is respiratory failure, and PARDS remains a major entity in PICU admissions. The mortality rate varies widely due to associated factors like shock, sepsis, multi-organ involvement, and others [2]. In a meta-analysis by Wong JJ et al., the mortality rate was found to be around 24%, although there has been a downward trend in the last few decades [10]. An Indian study by Lodha R et al., showed that overall 75% of children died of ARDS. The major contributing factor was refractory hypoxaemia [11]. Another retrospective study by Chetan G et al., showed that the majority of ARDS cases are caused by primary lung pathology (53%), while the rest (47%) had non-pulmonary causes [12]. In both studies, there was no categorisation of the severity of ARDS and their outcome based on severity.

With this background, this study was planned to investigate the clinical profile in terms of aetiology and outcome of paediatric patients with moderate to severe ARDS in the PICU and was conducted to observe the mortality in different categories of ARDS.

MATERIALS AND METHODS

This prospective cohort study was conducted in the PICU of Dr. B C Roy Postgraduate Institute of Paediatric Sciences, Kolkata, West Bengal, India. The study took place over a period of one year from July 2018 to June 2019. The study commenced after obtaining approval from the Institutional Ethics Committee (BCH/ME/PR/2675A dated 25/09/2017).

Inclusion criteria: All children aged between two months and 12 years admitted to the PICU with respiratory distress were selected. Children exhibiting tachypnoea and respiratory distress, as indicated by head nodding, grunting, stridor, sub-costal and/or intercostal retractions, were admitted to the emergency ward and, after initial management, were transferred to the PICU [13]. Additionally, patients admitted to the High Dependency Unit (HDU) or PICU for other reasons who developed signs of respiratory distress during their stay were screened for ARDS.

Exclusion criteria: Children with known congenital heart disease, chronic lung or kidney disease, and pulmonary anomalies were excluded.

After obtaining written informed consent in the local vernacular language, patients who met the inclusion criteria were included in the study.

Procedure

Data collection: Detailed histories were obtained, and clinical examinations were conducted. Patients identified with moderate to severe ARDS either by Berlin's criteria or PALICC criteria were included in the study [7,8]. Patients were categorised as having moderate ARDS when the Oxygenation Index (OI) remained >8-16, Oxygen Saturation Index (OSI) was 7.5-12.3, or PaO_2/FiO_2 was 101-200. Severe ARDS cases were identified when OI was >16, OSI was >12.3, or PaO_2/FiO_2 was <100.

Demographic details, clinical findings, and laboratory reports were collected during their stay. All relevant investigations to detect ARDS, assess its severity, and determine the aetiology were performed. This included complete blood count, liver and renal function tests, serum electrolytes, glucose levels, blood culture, tracheal aspirate for culture and sensitivity, viral studies using nucleic acid amplification tests, arterial blood gas measurements, chest imaging, and echocardiography.

The authors, through these investigations identified the direct predisposing factors of ARDS, where the primary involvement is in the lung epithelium, and the indirect predisposing factors, where the primary organ involvement is elsewhere, subsequently affecting the lung through endothelial disruption. ARDS caused by direct factors is distinct from ARDS resulting from indirect causes [14].

All children in the study were mechanically ventilated in pressure-controlled mode using a Maquet SERVO-i ventilator. Tidal volume was maintained in the range of 5-6 mL/kg of body weight with PEEP levels ranging from 5-15 cm H_2O, while efforts were made to keep driving pressure between 15-20 cm H_2O. Some patients required higher PEEP to sustain oxygenation. Patients were divided into three groups based on PEEP levels: 5-8 cm H_2O, 9-12 cm H_2O, and >12 cm H_2O. Based on Peak Inspiratory Pressure (PIP), patients were categorised into two groups: <30 cm H_2O and 30-35 cm H_2O for this study. Recruitment manoeuvres and prone positioning were attempted in patients who did not achieve an SpO_2 above 88% with conventional pressure-controlled mode using high PEEP, and the PRVC mode was employed to reach the target SpO_2 [8]. Arterial lines were not utilised in any patients, but central venous lines were placed in all patients. The $EtCO_2$ monitoring was conducted for all children. No patients underwent high-frequency oscillatory ventilation. Outcomes in terms of mortality were recorded.

STATISTICAL ANALYSIS

The data analysis was conducted using Statistical Package for Social Sciences (SPSS) version 20.0. The chi-square test, Fisher's test, and t-tests were performed where applicable to determine the association between categorical variables. The level of significance (p-value) for this study was set at 0.05.

RESULTS

A total of 713 admissions were recorded in the PICU during the study period, of which 120 children met the criteria for moderate to severe ARDS. Therefore, the prevalence of moderate to severe ARDS was 16.83%.

The age distribution ranged from three months to 12 years, with a mean age of 37.67±28.5 months. The Interquartile Range (IQR) was 50 (2-60 months). Among the children, 55 (45.8%) were infants, 37 (30.8%) were in the one to five-year age group, and 28 (23.3%) were in the 5 to 12 years age group, respectively. Of the total cases, 45 (37.5%) were females. The mortality rate was notably higher in the lower age group. The overall mortality rate for moderate to severe ARDS was 64.2%. In the study group, 79 (65.8%) patients were diagnosed with primary ARDS, while 41 (34.2%) patients developed ARDS later in the course. It was observed that 46 (38.3%) cases had moderate ARDS (P/F ratio 100-200). Among children with severe ARDS, the mortality rate was 77% compared to 43.5% in cases of moderate ARDS. Analysis of these results revealed a statistically significant relationship between the P/F ratio and mortality (p<0.0001) [Table/Fig-1].

Parameters	Distribution	Number of children n (%) [Total N=120]	Death n (%) [Total N=77]	Discharged n (%) [Total N=43]
Age group	3 months to <1 year	55 (45.8)	52 (94.5%)	3 (5.5%)
	1 year to <5 years	37 (30.8)	13 (35.1%)	24 (64.9%)
	5 years to 12 years	28 (23.3)	12 (42.9%)	16 (57.1%)
Sex	Male	75 (62.5)	49 (65.3%)	26 (34.7%)
	Female	45 (37.5)	28 (62.2%)	17 (37.8%)
Types of ARDS	Primary	79 (65.8)	42 (53.2)	37 (46.8)
	Secondary	41 (34.2)	35 (85.4)	6 (14.6)
Severity of ARDS	Moderate	46 (38.3)	20 (43.5)	26 (56.5)
	Severe	74 (61.7)	57 (77.0)	17 (23.0)

[Table/Fig-1]: Demographic distribution of study subjects according to the outcome.

A total of 39 patients (32.5%) had a total white blood cell count above 11000, of which 25 (64.1%) patients died. C-Reactive Protein (CRP) levels were elevated in 79 (65.83%) patients, of which 53 (67.1%) patients died. Abnormal serum creatinine levels were observed in 38 (31.7%) patients, of which 32 (84.2%) died. Elevated liver enzymes were found in 33 (27.5%) patients, of which 12 (36.3%) patients died. Hyponatraemia was present in 62 (51.7%) patients, and hypernatraemia was found in 5 (4.1%) patients. Hypoglycemia was evident in 19 (15.8%) patients [Table/Fig-2].

Parameters	Frequency (%)	Mortality (%)
White Blood Cell (WBC) >11000	39 (32.5)	25 (64.1)
C-reactive Protein positive	79 (65.83)	53 (67.1)
Serum Creatinine	38 (31.7)	32 (84.2)
Liver enzymes	33 (27.5)	12 (36.3)
Hyponatraemia	62 (51.7)	29 (46.77)
Hypernatraemia	5 (4.1)	2 (40)
Hypoglycaemia	19 (15.8)	15 (78.95)

[Table/Fig-2]: Laboratory parameters.
[Total participants=120 patients]

Direct lung injury accounted for 79 cases (65.5%), with pneumonia being the most common cause (94%). The remaining cases (34.5%) were attributed to non-pulmonary aetiologies. Non-pulmonary sepsis (91%) was the leading cause among indirect causes of lung injury. The mortality rate among children with pneumonia and non-pulmonary sepsis was 40 (53.3%) and 31 (83.8%), respectively. There was a statistically significant association between predisposing factors and the outcome, with a p-value of 0.0090 [Table/Fig-3].

stay for children who died was 4.2208±1.1656, while for discharged children, it was 6.7907±1.3897. The duration of ventilator stay was significantly associated with the outcome [Table/Fig-4].

Blood culture reports were positive in 72 (60%) of children, of whom 58 (80.6%) died. Some patients with primary pneumonia also had positive blood cultures [Table/Fig-5].

Multiorgan failure developed in 76 (63.3%) of children, while disseminated intravascular coagulopathy developed in 53 (44.2%)

Predisposing factors				Death n (%)	Discharged n (%)	Total
Direct n=79	Pneumonia n=75	**Bacteria n=53**		23 (43.4)	30 (56.6)	53
		Streptococcus pneumoniae	21			
		Staphylococcus aureus	20			
		Acinetobacter boumanii	6			
		Pseudomonas aeruginosa	2			
		Klebsiella pneomoniae	4			
		Viral n=22		17 (77.3)	5 (22.7)	22
		Adenovirus	8			
		H1N1	7			
		Influenza B	5			
		Human metapneumovirus	2			
	Aspiration n=2			1 (50.0)	1 (50.0)	2
	Drowning n=2			1 (50.0)	1 (50.0)	2
Indirect n=41	Non-pulmonary sepsis n=37			31 (83.8)	6 (16.2)	37
	Trauma			1 (100.0)	0 0.0	1
	Burn			1 (100.0)	0 0.0	1
	TRALI (Transfusion Related Acute Lung Injury)			1 (100.0)	0 0.0	1
	Others (Dengue IgM positive)			1 (100.0)	0 0.0	1

[Table/Fig-3]: Distribution of predisposing factors.
p-value=0.0090

A significant association was found between the PaO_2/FiO_2 ratio and the outcome. The association between maximum PEEP and the outcome was significant, as was the association between maximum PIP and the outcome. The mean duration of ventilation

of children. Among children with Multiple Organ Dysfunction Syndrome (MODS), the mortality rate was 71 (93.4%), and the death rate was 86.8% in children with Disseminated Intravascular Coagulation (DIC). A total of 58 (80.5%) children with positive blood

		Mean	SD	Minimum	Maximum	Median	p-value
PEEP Max (cm of H_2O)	Death	13.7662	0.9304	12.0000	16.0000	14.0000	**<0.0001**
	Discharged	9.1628	0.9494	8.0000	11.0000	9.0000	
PIP Max (cm of H_2O)	Death	33.5455	1.4377	29.0000	35.0000	34.0000	**<0.0001**
	Discharged	28.6279	1.8130	23.0000	32.0000	29.0000	
Duration of ventilation Stay (days)	Death	4.2208	1.1656	3.0000	9.0000	4.0000	**<0.0001**
	Discharged	6.7907	1.3897	4.0000	9.0000	7.0000	

[Table/Fig-4]: Distribution of mean PEEP max; mean PIP max and duration of ventilation stay: outcome; Death (n)=77; Discharged (n=43).

	Blood culture positive	Type of microorganism n		Death	Discharge
Non-pulmonary sepsis	37	*Acinetobacter baumannii*	11	31	6
		Klebsiella pneumonia	10		
		Pseudomonas aeruginosa	2		
		Escherichia coli	6		
		Salmonella sp.	4		
		Staphylococcus aureus	1		
		Enterococcus	3		
Burn	1	*Pseudomonas aeruginosa*		1	0
Pneumonia with sepsis	32	*Staphylococcus aureus*	20	25	7
		Acinetobacter baumannii	6		
		Pseudomonas aeruginosa	2		
		Klebsiella pneumonia	4		
Drowning	2	*Acinetobacter baumannii*		1	1
Total	72			58	14

[Table/Fig-5]: Distribution of microorganisms in blood culture.

culture reports died. All patients received various types of inotropic support, and the mean Vasoactive Inotropic Score (VIS) at 24 hours was 69.56±26.69 in the non-survivor group and 45.79±31.39 in the survivor group. In the moderate PEEP Max group (9-12), the mortality rate was 33.3%. All patients (100%) in the severe PEEP max group (>12) died. Among the 90 patients with a PIP max of 30-35, 76 (84.4%) died. Out of 74 children with severe ARDS (PaO_2/FiO_2 ratio <100), 57 (77%) died [Table/Fig-6].

Conditions	Frequency (%)	Mortality (%)
MODS	76 (63.3)	71 (93.4)
DIC	53 (44.2)	46 (86.8)
Blood culture positive sepsis	72 (60.0)	58 (80.5)
PEEP Max (5-8)	29 (24.2)	2 (6.9)
PEEP Max (9-12)	24 (20.0)	8 (33.3)
PEEP Max (>12)	67 (55.8)	67 (100)
PIP Max (<30)	30 (25.0)	1 (3.3)
PIP Max (30-35)	90 (75.0)	76 (84.4)

[Table/Fig-6]: Mortality analysis with different parameters.
MODS: Multiple organ dysfunction syndrome; DIC: Disseminated intravascular coagulation

The PRVC mode was applied in 70 patients (58.3%), all of whom had a 100% mortality rate. Recruitment manoeuvres were performed in 92 (76.7%) patients, and prone positioning was done in 103 patients (85.8%).

DISCUSSION

The prevalence of moderate to severe ARDS among PICU admissions was higher in the present study (16.83%) compared to other studies [Table/Fig-7] [11,14-18]. In an Indian study, the prevalence of ARDS was reported to be 9.9% [16]. The high turnover rates in the PICU may be a probable cause of this high prevalence of ARDS. In another Indian study by Yadav B et al., the prevalence of ARDS was found to be 11.4% with a mortality rate of 45.2% [15].

Authors name (Ref no.)	Place and year of the study	Sample size	N (%) of subjects with ARDS	Outcome in terms of mortlity (%)
Lodha R et al., [11]	New Delhi, India 1998-2000	992	20 (2.01)	75%
Yadav B et al., [14]	North India, PGI Chandigarh 2015-16	1215	121 (11.4)	45.2%
Pujari CG et al., [15]	South India 2016-2020	Chart review of all PICU admission	89 (7.8)	33.7%
Hu X et al., [17]	China 2010 (published)	11521	306 (2.7)	44.8%
Erickson S et al., [18]	Australia and New Zealand 2007(published)	All children admitted to ICU	117 (2.2)	35%

[Table/Fig-7]: Comparison with other studies [11,14,15-18].

In a study by Gupta S et al., primary ARDS due to pneumonia and aspiration accounted for 75% of cases, with the remaining 25% attributed to sepsis [16]. This finding is similar to the present study, where a direct lung cause was responsible for 65.83% of ARDS cases. In a study by Bouziri A et al., a primary lung cause was responsible for 76.2% of cases, which is also comparable to the present study [17]. In a study by Yadav B et al., the most common primary aetiologies of ARDS were pneumonia, severe sepsis, and scrub typhus, which is comparable [15]. The study by Pujari CG et al., showed pneumonia (66%) as the most common cause of ARDS with the majority (35.9%) moderate ARDS group [18]. This finding is similar to the present study. In the study by Gupta S et al., sepsis was identified as the precipitating cause of PARDS in 37% of cases [16]. In the present study, 37 patients (30.83%) had sepsis that led to the development of ARDS, and the result is comparable.

The death rate was significantly high at 64.2% in the present study compared to the mortality rate of 24% derived from pooled data in the meta-analysis conducted by Wong JJ et al., [10]. In an Indian study, the overall mortality rate for ARDS was reported to be 33% [18]. The wide variation in mortality rates may be attributed to the consideration of only the moderate to severe category of ARDS in the present study. Additionally, the absence of advanced ventilation modalities like high-frequency oscillatory ventilators, inhaled Nitric Oxide therapy, and extracorporeal membrane oxygenation therapy in our centre may have contributed to the higher mortality rate. The study by Yadav B et al., demonstrated a mortality rate of 45.2%, which is consistent with the present findings [15]. The mortality rate was particularly high in the infantile age group (94.54%) in the present study, with most of them also experiencing MODS (n=50). In studies by Hu X et al., and Lodha R et al., no specific age group was significantly associated with high mortality [11,19]. In a prospective multicentre study by Erickson S et al., in Australia and New Zealand on acute lung injury in the PICU, they identified older age as a risk factor for mortality [20]. However, in the present study, mortality was highest below one year of age [Table/Fig-1].

In a prospective observational multicentre study in North America, the mortality rate was reported to be 17% [21]. This wide variation is likely due to early diagnosis and better supportive and advanced therapeutic care in developed countries. In a retrospective study from North India, the mortality rate was 57.7%, which closely aligns with the results of the present study [16]. Another one-year study from Tunisia revealed an overall mortality of 66.7%, which is comparable to the present study. However, mortality was higher in patients with primary lung pathology (70%) than in children with other non-pulmonary causes [17]. This finding contrasts with the study here, where mortality was higher for sepsis-induced ARDS.

In this study, it was found that 76 (63.3%) of children developed MODS during their hospital stay, with 93% of these children experiencing death. The relationship between MODS and outcome was statistically significant (p<0.0001). This finding was supported by the study conducted by Chetan G et al., where they observed 100% mortality in children who developed MODS [12]. Hu X et al., in their multicentric collaborative study, documented that the predominant cause of death in ARDS was MODS, accounting for 81% of cases [19]. Another study by Dowell JC et al., found that 41% of deaths from ARDS were attributed to multi-organ failure [22]. The limitation of available intensive care facilities may be the cause of this difference. In the present study, 53 (44%) of children developed DIC during their hospital stay, and 86.8% (n=46) of them died due to this complication (p<0.0001). This finding is consistent with the study conducted by Chetan G et al., which reported a 100% mortality rate in children with DIC as a complication [12].

In this study, the authors found that 38.3% of cases had moderate ARDS (P/F ratio 100-200) and 61.7% of cases had severe ARDS (P/F ratio <100) on Day 1 of admission at the PICU. The mortality rate was 77% in severe ARDS compared to 43.5% in moderate ARDS, and a statistically significant relationship was found between the P/F ratio and mortality (p<0.0001). Wolfler A et al., reported that mortality in children with severe ARDS was 78.3% compared to 21.7% in moderate ARDS [23]. In a multicentre study by Hu X et al., a P/F ratio <100 mm Hg had a mortality rate of 62% compared to 31% in a P/F ratio of 100-200 mmHg [19]. Similarly, Erickson S et al., studied 117 cases and noted that a minimum P/F ratio <53 mmHg predicted mortality exceeding 70.5% with a specificity of over 92% [20]. The study by Pujari CG et al., attributed 58% of deaths to severe ARDS [18].

The authors divided the study population into two groups based on the maximum PIP used in ventilated children. In 25% of cases, we used <30 cm H_2O of PIP (Group-1), while in 75% of cases, we used 30-35 cm H_2O of PIP (Group-2). In the present study, the mortality rate in Group-1 was 3.3%, whereas in Group-2, it was 84.4%. The results of the present study showed a significant relationship between the use of high PIP and increased mortality (p<0.0001).

The mean PIP max was 28 cm H_2O in the discharged population of our study compared to 33 cm H_2O in children who died. This finding is in line with the study by Lodha R et al., which indicated that high PIP was used in the non-survivors group of ARDS in an attempt to improve oxygenation in children with more severe disease [11].

The mean PEEP MAX used in survivors was 9.1628±0.949 cm H_2O, while in non-survivors it was 13.7±0.93 cm H_2O. These findings are consistent with the study conducted by Bouziri A et al., who reported that the mean maximum PEEP used in survivors was 8.2±1.5 [17]. Another study by Chetan G et al., found that the mean PEEP max used in the survivor group was 10 cm H_2O [12]. Erickson S et al., identified a statistically significant correlation between the increase in PEEP and the increase in mortality [20].

In present study population, the mean duration of ventilator stay was 6.7±1.3 days in children who were discharged. The mean value was 4±1.1 days in the non-survivor group, and this result was statistically significant. Similar results were reported by Chetan G et al., where the mean duration of ventilator stay was 6.8 days in the survivor group and 3.7 days in children in the non-survivor group of ARDS [12].

Limitation(s)

In this hospital-based study, there is a significant limitation in the availability of proper advanced management for paediatric ARDS, such as high-frequency oscillatory ventilators and Extra-Corpeal Membrane Oxygenation (ECMO). The administration of appropriate cardio-respiratory support could have further reduced the mortality rate.

CONCLUSION(S)

The Acute Respiratory Distress Syndrome (ARDS) is a common condition in the paediatric population with a significantly high mortality rate. Primary pulmonary pathology, such as pneumonia, was associated with ARDS in nearly one-third of patients. Non-pulmonary sepsis was identified as a significant predisposing factor for mortality and should be aggressively treated. Multi-organ failure was observed in 92% of patients who died from ARDS. Therefore, supportive care, including invasive monitoring and attention to multi-organ dysfunction, is crucial to improve outcomes. A minimum P/F ratio, high PEEP, and high PIP values were indicative of poor outcomes. Thus, lung-protective strategies and recruitment manoeuvres are essential. Further multi-centric studies, including all cases of ARDS, are needed to understand the detailed clinical profile and accurately reflect mortality rates in this region.

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