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Original Research Article

Clinico-demographic profile and outcome of patients admitted in pediatric intensive care unit

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Abstract

Background: Pediatric Intensive Care Units (PICUs) provide critical care for children with life-threatening conditions. Understanding the clinicodemographic characteristics and clinical severity on admission is essential for risk stratification and outcome prediction.

Objectives: To evaluate the demographic profile, clinical features and their association with outcomes in children admitted to the PICU.

Materials and Methods: This prospective observational study included 165 children admitted to the PICU in a tertiary care center from August 2023 to February 2025. Data on demographics, clinical presentation, nutritional status, immunization and underlying diseases was collected. Outcomes were classified as direct discharged from PICU, shifted to ward and discharged from ward, DAMA, LAMA or mortality

Results: The majority (45.45%) were aged >5 years, with a male predominance (61.8%) and predominantly from rural areas (58.79%) of lower to middle socioeconomic status (70%). Respiratory system involvement was predominant (28%). Incomplete immunization was observed in 78%. The overall mortality rate was 12%. Mechanical ventilation and use of inotropic support were strongly associated with mortality ($p<0.001$).

Conclusion: The mortality rate was 12%. Respiratory diseases followed by central nervous diseases are the most common cause of PICU admission. Presence of mechanical ventilation and use of inotropes were associated with increase mortality.

Keywords: Pediatric Intensive Care Unit (PICU), Clinico-demographic profile, Patient outcomes, Critical illness in children, Mortality and morbidity

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1. Introduction

Pediatric Intensive Care Units (PICUs) are highly specialized facilities designed to provide comprehensive and advanced care to critically ill children who require continuous monitoring, organ support, and specialized interventions. These units play a pivotal role in modern pediatric healthcare by offering life-sustaining therapies such as invasive mechanical ventilation, inotropic support, and advanced monitoring technologies that are not available in general pediatric wards. The establishment of PICUs has significantly improved survival and recovery rates for children with life-threatening illnesses and injuries.[1]

Globally, the pattern of admissions to PICUs is influenced by a wide spectrum of etiologies, ranging from acute infectious diseases, such as severe pneumonia and septicemia, to chronic medical conditions including congenital heart diseases, metabolic disorders, and neurological illnesses. The relative contribution of these conditions varies across regions depending on local epidemiology, healthcare access, and socioeconomic determinants. In high-income countries, advances in neonatal and pediatric care have shifted the burden towards complex congenital and chronic illnesses, whereas in low- and middle-income countries (LMICs), infectious diseases and preventable conditions remain the predominant causes of critical illness in children.[2]

Despite significant advances in pediatric critical care medicine, mortality rates within PICUs continue to remain substantial, particularly in LMICs. This disparity is attributed to multiple factors, including limited healthcare resources,

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late presentation of critically ill children, inadequate referral systems, malnutrition, and gaps in routine immunization coverage. These challenges not only increase the risk of severe illness but also complicate the clinical course and outcomes once children are admitted to intensive care. Furthermore, mortality and morbidity outcomes are often affected by delays in recognition and timely intervention, as well as by socioeconomic constraints that limit families' ability to pursue or sustain prolonged intensive treatment.[3]

In this context, local data on PICU demographics, admission diagnoses, resource utilization, and outcome predictors become essential. Such information provides valuable insights into the unique challenges faced by healthcare providers in different regions and allows for better planning of preventive strategies, resource allocation, and improvement of clinical protocols. Moreover, analyzing associations between demographic factors, clinical severity indicators, and mortality outcomes enables identification of high-risk groups, thereby guiding early and targeted interventions.

The present study was undertaken to describe the clinico-demographic characteristics of children admitted to the PICU of a tertiary care center in Northern India. Additionally, the study aims to evaluate the association of these characteristics with mortality and treatment outcomes. By understanding the patterns of illness, demographic influences, and outcome determinants, this study seeks to contribute to the development of more effective strategies for reducing pediatric morbidity and mortality in resource-constrained settings.[4]

2. Materials and Methods

2.1. Study design and setting

A prospective observational study was conducted over 19 months from August 2023 to February 2025 in the tertiary care hospital.

2.2. Participants

Children aged 1 month to 14 years admitted to the PICU were included. Exclusion criteria were death within one hour of admission or discharge against medical advice within 24 hours.

2.3. Data collection

Detailed demographic data—age, sex, residence (urban/rural), socioeconomic status (Modified Kuppuswamy Scale) and immunization history—were collected. Clinical data included primary system involvement, nutritional status (classified per WHO criteria), underlying chronic illnesses, and history of surgery.

2.4. Outcome measures

The primary outcomes of the study included direct discharge from the PICU, transfer to the general ward, discharge against medical advice (DAMA), left against medical advice (LAMA) and mortality. Secondary outcomes comprised the length of PICU stay, need for mechanical ventilation, requirement of inotropic support, and their association with mortality.

2.5. Statistical analysis

Data were analyzed using SPSS v25. Categorical data was presented As numbers and percentages, while parametric data was presented as mean ± standard Deviation (SD). Categorical data was analysed using the Chi-square test or Fisher's exact Test, as appropriate. Comparisons between survivors and non-survivors were done. A p-value <0.05 was considered statistically significant.

3. Results

3.1. Demographic and clinical characteristics

A total of 165 children were enrolled. Infants (1 month to 1 year) accounted for 44.8% of admissions, followed by children aged 1–5 years (32.1%), and 6–14 years (23.1%). Male patients predominated (63.6%). Most children (67.3%) were from rural areas, with 58.2% belonging to lower socioeconomic strata. **(Table 1)**

Table 1: Demographic profile of patients admitted in PICU

Age group	**Number**	**Percent (%)**
<1 Year	40	24.24
1-5 Years	50	30.30
>5 Years	75	45.45
Total	165	100.00
Sex	**Number**	**Percent (%)**
Female	63	38.18
Male	102	61.82
Total	165	100.00
Residence	**Number**	**Percent (%)**
Urban	68	41.21
Rural	97	58.79
Total	165	100
Socioeconomic Status	**Number**	**Percent (%)**
Upper	0	0
Upper Middle	49	30
Lower Middle	78	47
Upper Lower	37	22
Lower	1	1
Total	165	100

3.2. Clinical characteristics of patients admitted in PICU

Respiratory system involvement was the most frequent primary diagnosis (51.5%), followed by neurological (17.6%) and cardiovascular (13.3%) diseases. Overall, 77.5% of children were partially immunized, 21% were completely immunized, and 1.2% had not received any immunization. Chronic illnesses were observed in 28% of patients, while 22% had a history of prior surgery.21% of children were underweight, and 12% were stunted. **(Table 2), (Table 3)**

Table 2: Primary system involved at admission

System involvement	Number	Percent (%)
Respiratory system	47	28
CNS (Central Nervous System)	40	24
G.I.T (Gastrointestinal Tract System)	20	12
Endocrine / DKA	14	8
Hepatobiliary diseases	11	7
Sepsis	10	6
Others	10	6
CVS (Cardiovascular System)	8	5
Renal	5	3
Total	165	100

Table 3: Immunization, nutritional status, underlying disease, and previous surgery in children admitted to PICU (N=165)

Category	Variable	Group	Number	Percent (%)
Immunization status	< 1 year	Fully immunized	16	–
		Partially immunized	22	–
		Not immunized	2	–
	1–5 years	Fully immunized	12	–
		Partially immunized	38	–
		Not immunized	0	–
	> 5 years	Fully immunized	7	–
		Partially immunized	68	–
		Not immunized	0	–
Nutritional status (Weight-for-Age)	Normal	–	117	71
	Underweight	–	48	29
Nutritional status (Height-for-Age)	Normal	–	146	88
	Stunted	–	19	12
Underlying disease	Yes	–	33	20
	No	–	132	80
Previous surgery	Yes	–	7	4
	No	–	158	96

3.3. Outcomes

Of the 165 patients admitted to the PICU, 67% were transferred to the ward and subsequently discharged, 5% were discharged directly from the PICU, 9% were discharged against medical advice (DAMA), 7% left against medical advice (LAMA), and 12% died during their PICU stay. Inotropic support was required in 19.4% of cases, while 80.6% did not receive any. Respiratory support was administered to 69% of patients, with 57% receiving invasive ventilation and 43% managed with non-invasive modalities. Regarding the duration of PICU stay, 48% were discharged within 5 days, 39% stayed for 5–10 days, 5% for 11–15 days, and 7% for more than 15 days. The mean length of stay was 6 days. On comparing various clinic demographic characteristics based on mortality of the children, statistically significant difference was found with presence of shock and need for invasive mechanical ventilation. **(Figure 1), (Table 4)**

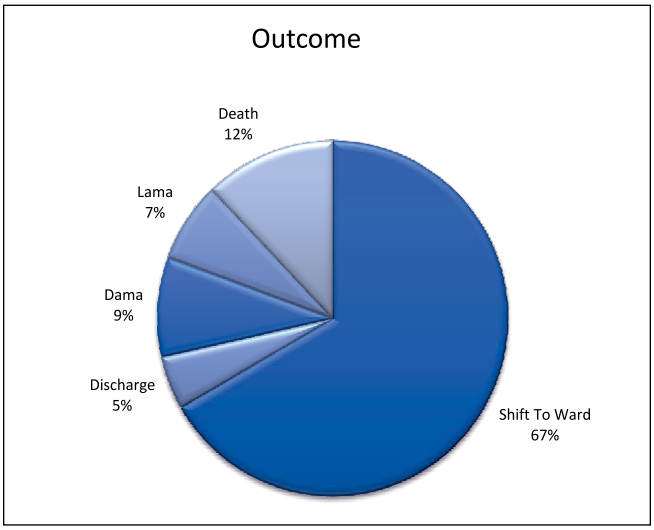

Figure 1: Final outcome of patients admitted in PICU

Table 4: Association of some demographic and clinical characteristics between survivors and non-survivors

Variable	Alive n (%)	Died n (%)	p-value
Age			
Age <1 Year	37(25.5)	3 (15)	0.532
Age 1–5 Year	44(30.3)	6 (30)	
Age >5 Year	64(44.2)	11 (55)	
Sex			
Male	91 (62.8)	11(55)	0.58
Female	54 (37.2)	9 (45)	
Residence			
Urban	59 (40.7)	9 (45)	0.713
Rural	86 (59.3)	11 (55)	
Socioeconomic status			
Upper Middle	46 (31.7)	3 (15)	0.339
Lower Middle	65 (44.8)	13 (65)	
Upper Lower	33 (22.7)	4 (20)	
Lower	1 (0.7)	0 (0)	
Underlying disease			
No	115 (80)	17 (85)	0.766
Yes	30 (20)	3 (15)	
Previous surgical history			
Yes	6 (4.1)	1 (5)	0.276
No	105 (72.4)	19 (95)	
Immunization history			
Fully immunized	32(22)	3(15)	0.210
Partially immunized	112(77.4)	16(80)	
Not immunized	1(0.6)	1(5)	
Presence of Shock			
Present	15 (10.3)	17 (85)	<0.001
Absent	130 (89.7)	3 (15)	
Assisted ventilation			
Invasive	45 (31)	20	<0.001
Non-Invasive	49 (33.8)	0	
No ventilator support	51 (35.2)	0 (0)	
PICU Stay mean ±SD	4.6±2.57	6.57±5.8	0.234

4. Discussion

The present study observed that the majority of admissions to the PICU were among children older than five years (45%), with a predominance of males (61.8%). Most of these patients belonged to rural areas (58.7%) and were from families of lower socioeconomic background (70%). These demographic findings suggest that children from socially and economically disadvantaged communities are disproportionately represented in PICU admissions. Noted higher PICU admissions among male children, infants, and those residing in rural areas with limited access to timely and quality healthcare services.[5,6] The gender difference may also be reflective of social factors, such as preferential care-seeking for male children in certain communities, combined with higher vulnerability to infections during early childhood. The predominance of rural and low-income representation highlights the persistent gaps in preventive healthcare and timely access to pediatric care in such populations.

With respect to disease profile, respiratory illnesses emerged as the most common cause of PICU admission (28%), followed by neurological and cardiovascular conditions.[7,8] The acute respiratory tract infections continue to be a leading cause of pediatric critical illness and remain the primary reason for PICU admissions in low- and middle-income countries (LMICs). The high prevalence of respiratory diseases in this cohort underscores the burden of preventable and treatable infections, often exacerbated by delayed presentation, poor immunization status, and inadequate access to primary healthcare. Neurological and cardiovascular

conditions, though less frequent, also constituted significant contributors to critical illness, reflecting the broad spectrum of morbidity that requires intensive pediatric care.

A concerning finding in the present study was that 79% of admitted children had incomplete immunization histories, indicating suboptimal vaccine coverage in the catchment population. This is particularly alarming because incomplete immunization predisposes children to vaccine-preventable diseases that often progress to severe illness requiring intensive care. Similarly reported poor immunization coverage as a major contributing factor to avoidable pediatric ICU admissions. This highlights an urgent need for strengthening immunization programs, ensuring community awareness, and addressing sociocultural barriers to vaccination in order to reduce preventable morbidity and mortality.[9]

Interestingly, although demographic variables such as age, sex, socioeconomic status, and immunization history were not found to have a statistically significant association with mortality in this study, the presence of shock ($p < 0.001$) and the requirement for invasive mechanical ventilation ($p < 0.001$) were strongly correlated with adverse outcomes. This finding emphasizes that clinical severity at admission and the need for advanced life-support measures are more decisive in determining prognosis than demographic characteristics alone. The high mortality risk among children who required inotropes or invasive ventilation is in agreement with the results of Vijayaraghavan and Sasivarathan,[10] who identified these interventions as independent predictors of mortality in critically ill children, particularly those presenting with altered sensorium. Similarly, the presence of shock has consistently been described as a critical determinant of poor outcomes, reflecting the severity of circulatory failure and multi-organ dysfunction.[11] These associations underline the importance of early recognition and aggressive management of shock, as well as judicious use of mechanical ventilation, to potentially improve outcomes.

The overall mortality rate in this cohort was 12%, which falls within the range of PICU mortality rates reported in similar resource-constrained settings (10–20%).[12,13] The majority of patients (67%) demonstrated clinical improvement and were shifted to the ward, signifying the effectiveness of timely intensive care in reversing acute critical illness in children. However, 16% of patients left against medical advice, which is a significant proportion and may reflect financial constraints, lack of awareness, or sociocultural beliefs influencing healthcare decisions. The average length of PICU stay was six days, which is comparable to other Indian studies, although it was noted that non-survivors had a longer average duration of stay. This extended hospitalization among non-survivors likely reflects more complex clinical trajectories, refractory illnesses, or complications arising during the course of management, as supported by findings from previous literature.

In summary, the present study highlights the demographic and clinical patterns of PICU admissions in a resource-limited setting, emphasizing the continued predominance of respiratory illness, the concerning prevalence of incomplete immunization, and the critical impact of shock and invasive ventilation requirements on mortality outcomes. These findings are consistent with national and international evidence and point toward the need for improving preventive healthcare strategies, particularly immunization, while also strengthening early recognition and aggressive management of critically ill children to optimize survival outcomes.[14,15]

5. Conclusion

In the present study, it was observed that the majority of children admitted to the PICU belonged to the age group of more than five years, with a predominant representation from rural communities and families of low to moderate socioeconomic status. This reflects the continued vulnerability of children from socially and economically disadvantaged backgrounds, who may have delayed access to healthcare facilities and present with more advanced stages of illness requiring intensive care.

Among the spectrum of diseases leading to PICU admission, respiratory illnesses constituted the most common cause, followed by disorders of the central nervous system. This finding highlights the ongoing burden of respiratory tract infections and related complications as the leading contributors to critical illness in the pediatric population, while neurological diseases also remain an important cause of morbidity requiring intensive care management.

A considerable proportion of admitted children required advanced supportive measures, including ventilatory support and inotropic therapy. These interventions were strongly associated with prolonged hospital stays, reflecting the severity of illness and complexity of care in this subgroup of patients. Despite optimal supportive management, outcomes in these children were often less favorable, underscoring the importance of early identification and prompt treatment of critically ill children before the onset of severe organ dysfunction.

The overall mortality rate in this cohort was 12%, which is consistent with mortality rates reported in comparable studies from similar settings. While two-thirds of children showed improvement and were successfully shifted to the ward, it was concerning that nearly one-fifth (18%) of the families chose to discontinue treatment and left the hospital either against medical advice or by taking premature discharge. Such decisions may be influenced by a range of factors including financial constraints, sociocultural beliefs, or perceived futility of care in critically ill patients, and they represent a significant challenge in improving pediatric critical care outcomes.

In conclusion, the study underscores the need for strengthening preventive healthcare measures, particularly in rural and socioeconomically weaker populations, while also enhancing timely access to intensive care services. Focused efforts on improving immunization coverage, early recognition of respiratory and neurological illnesses, and community education may help reduce the burden of PICU admissions and improve overall survival rates in children.

6. Source of Funding

None.

7. Conflict of Interest

None.

References

1. Joshi P, Agrawal S, Sah UP. Study of morbidity and mortality pattern of children admitted in paediatric intensive care unit of tertiary care children's hospital. *J Nepal Paediatr Soc.* 2020;40(3):232–40. https://doi.org/10.3126/jnps.v40i3.29108
2. Maheswari K, Sharma N. Clinical profile and outcome of patients admitted to pediatric intensive care unit in a tertiary care teaching hospital of Puducherry, India. *Int J Contemp Pediatr*. 2020;7(6):1280–3. https://doi.org/10.18203/2349-3291.ijcp20202134
3. Slusher TM, Kiragu AW, Day LT, Bjorklund AR, Shirk A, Johannsen C, et al. Pediatric critical care in resource-limited settings—overview and lessons learned. *Front Pediatr*. 2018;6:49. https://doi.org/10.3389/fped.2018.00049
4. Odetola FO, Gebremariam A, Freed GL. Patient and hospital correlates of clinical outcomes and resource utilization in severe pediatric sepsis. *Pediatrics*. 2007;119(3):487–94. https://doi.org/10.1542/peds.2006-2353
5. Volakli E, Sdougka M, Tamiolaki M, Tsonidis C, Reizoglou M, Giala M. Demographic profile and outcome analysis of pediatric intensive care patients. *Hippokratia*. 2011;15(4):316–22.
6. Khemani RG, Smith LS, Zimmerman JJ, Erickson S. Pediatric Acute lung injury consensus conference group. Pediatric acute respiratory distress syndrome: Definition, incidence, and epidemiology: proceedings from the pediatric acute lung injury consensus conference. *Pediatr Crit Care Me*d. 2015;16(5 Suppl 1):S23–40. https://doi.org/10.1097/PCC.0000000000000432
7. Ping Kirk AH, Sng QW, Zhang LQ, Ming Wong JJ, Puthucheary J, Lee JH. Characteristics and outcomes of long-stay patients in the pediatric intensive care unit. *J Pediatr Intensive Care*. 2018;7(1):1–6. https://doi.org/10.1055/s-0037-1601337
8. Sahoo B, Patnaik S, Mishra R, Jain MK. Morbidity pattern and outcome of children admitted to a paediatric intensive care unit of Eastern India. *Int J Contemp Pediatr*. 2017;4(2):486–9.
9. Musa N, Murthy S, Kissoon N, Lodha R, Ranjit S. Pediatric sepsis and septic shock management in resource-limited settings. In: Dondorp AM, Dünser MW, Schultz MJ, editors. Sepsis management in resource-limited settings [Internet]. Cham (CH): Springer; 2019. Chapter 10. Available from: https://www.ncbi.nlm.nih.gov/books/NBK553811/
10. Vijayaraghavan S, Sasivarathan R. Pediatric risk of mortality III score in predicting mortality in children with altered sensorium in pediatric intensive care unit. *Int J Contemp Pediatr.* 2019;6(4):1461–5. https://doi.org/10.18203/2349-3291.ijcp20192604
11. Sharma AK, Gurung B. Profile and outcome of patients admitted to pediatric intensive care unit at a general referral hospital. *J Inst Med Nepal*. 2019;41(3):17–23. https://doi.org/10.59779/jiomnepal.1056
12. Dendir G, Awoke N, Alemu A, Sintayhu A, Eanga S, Teshome M, et al. Factors associated with the outcome of a pediatric patients admitted to intensive care unit in resource-limited setup: Cross-sectional study. *Pediatric Health Med Ther*. 2023;14:71–9. https://doi.org/10.2147/PHMT.S389404
13. Slusher TM, Kiragu AW, Day LT, Bjorklund AR, Shirk A, Johannsen C, et al. Pediatric critical care in resource-limited settings-overview and lessons learned. *Front Pediatr*. 2018;6:49. https://doi.org/10.3389/fped.2018.00049
14. Bacha AJ, Gadisa DA, Gudeta MD, Beressa TB, Negera GZ. Survival Status and Predictors of Mortality Among Patients Admitted to Pediatric Intensive Care Unit at Selected Tertiary Care Hospitals in Ethiopia: A Prospective Observational Study. *Clin Med Insights Pediatr.* 2023; 17:1–14. https://doi.org/10.1177/11795565231169498
15. Kirpal H, Behl A, Jain S, Pandit S. Clinical profile and outcome of patients admitted in pediatric intensive care unit of tertiary care teaching hospital of rural North India: An observational study. *Int J Contemp Pediatr*. 2024;11(7):921–8. https://dx.doi.org/10.18203/2349-3291.ijcp20241677

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