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Original Research Article

Etiological spectrum of Paediatric intensive care unit admissions in a Tertiary Care Hospital

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Abstract:

Background: The care of critically ill children in paediatric intensive care units (PICUs) is essential for improving outcomes in resource-limited settings. This study aimed to analyse the clinical profile and causes of admissions (morbidity patterns) in children admitted to a PICU in a tertiary care hospital in Northeast India, focusing on demographic factors, system involvement, and morbidity distribution.

Methods: This prospective observational study was conducted from July 2019 to June 2020 in the PICU of Silchar Medical College and Hospital, Assam. Children aged 1 month to 12 years admitted to the PICU were included, excluding those who died within 2 hours of admission, stayed beyond the study period, or left against medical advice. Data on demographics, source of admission, socioeconomic status (modified Kuppuswamy scale), and system involved, specific diagnoses, length of stay, and outcomes were collected using a predesigned proforma. Statistical analysis was performed using SPSS version 25, with chi-square tests for categorical variables ($p < 0.05$ considered significant).

Results: Of 747 children (58% male, Male:female ratio 1.38:1), 54.5% were under 1 year, 25.7% aged 1-5 years, and 19.8% aged 5-12 years. Mean length of stay was 7.99 ± 2.66 days (range 3-24 days). Admissions were primarily from emergency (42.6%), outpatient department (23.4%), and wards (22%). Most families were upper lower socioeconomic class (modified Kuppuswamy scale). Respiratory system disorders accounted for 24.9% of admissions (pneumonia 47.8%, bronchiolitis 22%), followed by infections/sepsis (19.7%), central nervous system (CNS) disorders (12.2%; meningitis 29.4%, febrile convulsions 25.3%), and renal disorders (12%; urinary tract infection 45.6%). Other systems included gastrointestinal (11%), cardiovascular (8.7%), haematological (3.1%), surgical (3.9%), poisoning (2.4%), and miscellaneous (2.1%). Differences in system involvement were not statistically significant ($p = 1.693$).

Conclusion: Respiratory and infectious diseases dominate PICU admissions in this setting, with infants most affected. Targeted interventions for preventable causes like infections and improved community education could reduce morbidity.

Keywords: Pediatric Intensive Care Units; Morbidity; Child; Hospitalization; Respiratory Tract Diseases; Sepsis.

Introduction

The management of critically ill children represents a challenging aspect of paediatrics, with paediatric intensive care units (PICUs) designed to provide advanced monitoring and support for conditions requiring respiratory, haemodynamic, or multi-organ interventions.

PICUs aim to reduce mortality and restore health with minimal complications, supported by specialised equipment and staffing.

In resource-constrained regions like Eastern India, PICUs are emerging, with limited data on admission patterns influencing resource allocation and outcomes. Globally, PICU admissions vary by region, with respiratory failure, sepsis, and neurological disorders common. In developing countries, infectious and respiratory diseases predominate due to socioeconomic factors, malnutrition, and delayed care-seeking. This study, conducted in the only PICU in Barak Valley, Assam, analysed morbidity patterns to inform local practices.

Aims and Objectives

- To study the clinical profile of children admitted to the PICU.
- To analyse causes of admissions (morbidity).

- To examine relationships between demographics, diagnoses, and admission causes.

Materials & Methods

Study Population and Setting: This prospective observational study included children aged >1 month to 12 years admitted to the PICU of Silchar Medical College and Hospital, a tertiary care institution in Cachar district, Assam, from July 2019 to June 2020.

Inclusion and Exclusion Criteria: Inclusion: Children meeting age criteria and admitted to PICU. Exclusion: Death within 2 hours of admission; stay beyond study period; age <1 month or >12 years; left/discharged against medical advice.

Ethical Considerations: Informed consent was obtained from parents/guardians. Ethical clearance was granted by the institutional committee.

Sample Size and Data Collection: All consecutive eligible cases (n=747) were included. Data were recorded on a predesigned proforma, including demographics, admission source, socioeconomic status (modified Kuppuswamy scale), nutritional status (WHO growth charts) and feeding history. Patients were categorised by age (<1 year, 1-5 years, >5 years), system involved (respiratory, CNS, renal, etc.), and diagnoses.

Statistical Analysis: Data were entered into Microsoft Excel and analysed using SPSS version 25. Numerical data: mean ± SD; qualitative: frequencies/percentages. Chi-square test assessed associations ($p<0.05$ significant).

Results

Gender Distribution: Of 747 children, 433 (58%) were male and 314 (42%) female (Male: female ratio 1.38:1) .

Age Distribution: Infants (<1 year) comprised 407 (54.5%), 1-5 years 192 (25.7%), and 5-12 years 148 (19.8%). Under-5s accounted for 80.2% of admissions.

Gender Distribution in Different Age Groups: Males predominated across groups: <1 year (236 males, 171females), 1-5 years (109 males, 83 females), >5 years (88 males, 60 females). Differences were not significant (p=0.990, 0.697, 0.681 respectively).

Length of Stay in Hospital: Mean stay: 7.99 ± 2.66 days (range 3-24 days) .

Source of Admissions: Emergency: 318 (42.6%); outpatient: 175 (23.4%); wards: 164 (22%); referrals: 85 (11.4%); theatres: 5 (0.7%).

Socioeconomic Profile: Upper lower: 464 (62.1%); lower: 150 (20%); lower middle: 112 (15%); upper middle: 20 (2.7%); upper: 1(0.1%).

Distribution as per System Involved: Respiratory: 186 (24.9%); infections/sepsis: 147 (19.7%); CNS: 91 (12.2%); renal: 90 (12%); gastrointestinal: 82 (11%); cardiovascular: 65 (8.7%); haematological: 23 (3.1%); surgical: 29 (3.9%); poisoning: 18 (2.4%); miscellaneous: 16 (2.1%). No significant difference (p=1.693).

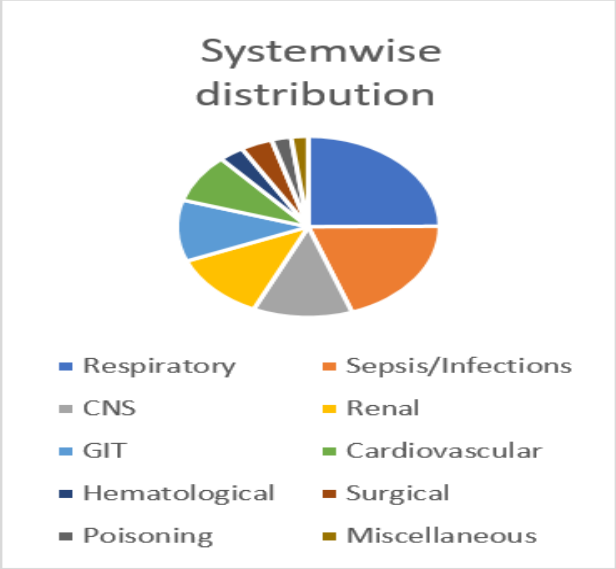

Figure 1:

Causes of Admission in PICU in Each System

Respiratory System: Pneumonia: 89 (47.8%); bronchiolitis: 41 (22%); asthma: 20 (10.8%); reactive airway disease: 21 (11.3%); tuberculosis: 7 (3.8%); others: 8 (4.3%).

Central Nervous System: Meningitis: 28 (29.4%); febrile convulsions: 24 (25.3%); seizure disorder: 15

(15.8%); acute encephalitis syndrome: 12 (12.6%); cerebral palsy with seizures: 6 (6.3%); head injury: 2 (2.1%); encephalitis: 3 (3.2%); encephalopathy: 1 (1.1%).

Renal System: Urinary tract infection: 41 (45.6%); nephrotic syndrome: 20 (22.2%); acute glomerulonephritis with left ventricular failure: 12 (13.3%); acute glomerulonephritis with hypertension: 16 (17.8%); chronic kidney disease: 1 (1.1%).

Gastrointestinal System: Acute gastroenteritis with dehydration: 35 (42.7%); viral hepatitis: 17 (20.7%); dysentery: 11(13.4%); hepatic encephalopathy: 10 (12.2%); gastrointestinal bleeding 5(6.1%): cirrhosis: 2 (2.4%); chronic liver disease: 2 (2.4%).

Cardiovascular System: Congenital heart disease: 40 (61.5%); myocarditis: 7 (10.8%); rheumatic heart disease: 7 (10.8%); hypertension: 4 (6.2%); infective endocarditis: 5 (7.7%); pericardial effusion: 2 (3.1%).

Haematological System: Anaemia: 6 (26.1%); acute lymphoblastic leukaemia: 5 (21.7%); haemophilia: 3 (13%); idiopathic thrombocytopenic purpura: 2 (8.7%), acute myeloid leukemia 2 (8.7%); sickle cell anaemia: 1 (4.3%); thalassaemia: 3 (13%).

Surgical: Intestinal obstruction: 11 (37.9%); intussusception: 7 (24.1%); post-operative: 5 (17.2%); hydrocephalus: 3 (10.3%); perforation 2(6.9%), renal calculi 1(3.4%).

Poisoning: Paracetamol: 7 (38.9%); kerosene: 3 (16.7%); organophosphorus: 3 (16.7%); snakebite: 1 (5.6%); vitamin A: 2 (11.1%); datura: 1(5.6%); diesal poison 1 (5.6%) .

Miscellaneous: Road traffic accident: 4 (25%); diabetic ketoacidosis: 2 (12.5%); drowning: 2 (12.5%); Kawasaki disease: 2 (12.5%); urticaria: 3 (18.8%); Guillain-Barré syndrome: 1 (6.3%); drug allergy: 1 (6.3%); burns: 1 (6.3%).

Discussion

In the present study, respiratory and infectious diseases emerged as the leading causes of PICU admission, consistent with patterns reported from other resource-limited settings in developing countries. Males predominated (58% vs. 42% females), a sex distribution similar to that reported by Sahoo B et al. [1], Siddharth V et al. [2], Esteban E et al. [3], and Abhulimhen-Iyoha BI et al. [4].

Infants (<1 year) constituted the largest age group, and children <5 years (including infants) accounted for 80.2% of total admissions. These findings align closely with previous studies; Abhulimhen-Iyoha BI et al.[4] reported 72.4% admissions in the under-five age group, while Sahoo B et al.[1] also observed infant predominance. The high burden in younger children reflects their greater physiological vulnerability and immature immune systems.

The mean duration of PICU stay in our cohort was 7.99 ± 2.66 days (range 3–24 days). This is longer than the 3.2 ± 4.5 days (range 0–28 days) reported by Abhulimhen-Iyoha BI et al.[4] and 2.21 ± 1.90 days (range 1–16 days) by Earan SK et al. [5], but considerably shorter than the 16.82 days (range 1–84 days) observed by Siddharth V et al. [2]. Such variations likely reflect differences in case severity, local disease spectrum, discharge policies, and availability of step-down facilities.

Respiratory illnesses (primarily pneumonia) accounted for 24.9% of admissions, comparable to the findings of Earan SK et al. [5] in South India. Infection/sepsis was the leading diagnostic category in the study by Sahoo B et al. [1] in Odisha. Central nervous system disorders contributed 12.2% of admissions in our series (predominantly meningitis, febrile seizures, seizure disorders, and acute encephalitis syndrome), which is similar to the 15.9% reported by Earan SK et al.[5].

Infants dominated admissions (54.5%), reinforcing the heightened susceptibility of children under five years due to immunological immaturity. A substantial proportion (42.6%) were emergency admissions, underscoring the need for timely community-level intervention and robust referral systems. Children from lower socioeconomic strata were over-represented, highlighting the interplay of poverty, malnutrition, and infectious diseases. The high burden of vaccine-preventable respiratory illnesses points to persistent immunisation gaps, whereas CNS and renal admissions reflect the continuing challenge of tropical infections and encephalitis in the region.

Limitations: This was a single-centre study without long-term outcome assessment.

Conclusion

In this tertiary-care PICU in Northeast India, respiratory diseases and sepsis remain the dominant causes of admission, with infants and young children from lower socioeconomic backgrounds being most affected. Targeted public health interventions focusing on immunization, early recognition of danger signs, and improvement in socioeconomic conditions are essential to reduce preventable PICU admissions.

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