



## Research Article

# A Retrospective Evaluation of Morbidity Pattern and Outcome of Patients Admitted into a Pediatric Intensive Care Unit in India

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## Abstract

**Background:** Intensive care has become very important in the management of critically ill children who require advanced airway, respiratory, and hemodynamic supports and are usually admitted into the pediatric intensive care unit (PICU) with the aim of achieving an outcome better than if the patients were admitted into other parts of the hospital. It becomes important to audit admissions and their outcome, which may help to modify practices if necessary following thorough introspection, leading to better patient outcomes.

**Objective:** To evaluate the morbidity pattern and outcome of admissions into the PICU of a tertiary care center in India.

**Methods:** A retrospective study in which records of admissions (January 2015 to August 2017) were obtained from the PICU records. Information retrieved included age, sex, weight, diagnosis, duration of stay in the unit, and outcome.

**Results:** Mean age of the studied 1231 patients was  $28.5419 \pm 36.8344$  months; 55.2% were infants and 61.2% were males. The three most common disease categories admitted were Respiratory disease (32.3%), neurological disorders (17.0%), and Infection other than sepsis- (11.7%). The mean duration of stay in PICU was  $7.42 \pm 7.72$  days. The overall mortality rate was 20.9%.

**Conclusion:** Mortality is moderate in our PICU. We conclude that a well-equipped intensive care unit with modern and innovative intensive care greatly facilitates the care of critically ill patients giving desirable outcome if there is early referral.

**Keywords:** PICU admission, morbidity pattern, outcome of patients, India.

## Introduction

Intensive care has become very important in the management of critically ill children. The pediatric intensive care unit (PICU) is a part of the hospital where critically ill pediatric patients who require advanced airway, respiratory, and hemodynamic supports are usually admitted with the aim of achieving an outcome better than if the patients were admitted into other parts of the hospital.<sup>1</sup> The care of critically ill children remains one of the most demanding and challenging aspects of the field of pediatrics. The main purpose of the PICU is to prevent mortality by intensively monitoring and treating critically ill children who are considered at high risk of mortality. This, however, comes at a huge cost to all the parties involved—the hospital, the personnel, and the care givers of patients.<sup>2</sup> It is usually only offered to patients whose condition is potentially reversible and who have a good chance of surviving with intensive care support. Since these patients are critically ill, the outcome of intervention is sometimes difficult to predict. In critical care medicine, intensive care unit (ICU) results can be assessed on the basis of outcomes such as “death” or “survival” by means of indicators such as mortality rates. Evaluation of the outcomes of medical interventions can assess the efficacy of treatment, making it possible to take better decisions, to further improve quality of care, to standardize conduct, and to ensure effective management of the high-level resources needed to deliver intensive care services thereby optimizing resource utilization.<sup>3</sup> Although mortality in patients depends on many factors such as demographic and clinical characteristic of population, infrastructure and non-medical factors (management and organization), case mix, and admission practice, it is also affected by ICU performance.<sup>4</sup> This study is, therefore, conducted to audit the pattern of cases being admitted into our PICU and their outcome. The term “audit” implies a professional commitment to improvement and involves a systematic approach highlighting opportunities for improvement and

positive change in clinical practice.<sup>5</sup> It becomes important to audit admissions and their outcome with the aim of modifying practices if necessary following thorough introspection, leading to better patient outcomes.

## Methods

This study was a retrospective record based study which reviewed the admissions into the PICU of a tertiary care centre in Kolkata, West Bengal for a period of 2.5 years from January 2015 to August 2017. The hospital has a well-equipped ten-bedded PICU with ten bedded step down with seven high end ventilator with dialysis facilities, which admits paediatric patient's upto 14 years of age, from medical specialties.

PICU records of all admissions, transfers out, discharges, and deaths were analyzed. Data collected on patients included age, gender, diagnosis, weight, duration of stay in the unit and outcome. The outcome was classified as transfers to the main pediatric wards, discharges, discharges against medical advice (DAMA) and death and referral discharge. All patients in the unit were treated according to the written standard protocol. Relevant investigations including haemoglobin, total and differential blood counts, electrolytes, urea, creatinine, blood glucose, blood culture and arterial blood gas were done at admission. Blood tests were repeated subsequently whenever required. Cerebrospinal fluid analysis was done for suspected central nervous system infections. Treatment was started as per the protocol. Antibiotic therapy was modified whenever necessary depending upon the culture and sensitivity pattern. Vasopressors were used for patients in shock or poor perfusion.

Suspected sepsis cases (with culture negative) and proven sepsis cases with culture positive body fluid were included in infectious disease. Suspected sepsis cases included those patients who had systemic inflammatory response syndrome. (Tachycardia, tachypnoea, temperature  $>38.5$  °C or  $< 36$  °C, abnormal leukocyte count or  $>10\%$  band cells.) Patients with tropical diseases

(malaria/typhoid/dengue/scrub typhus) and or positive viral marker were included in other than sepsis group.

**Results**

During the period of the study, a total of 1231 patients were admitted into the PICU. There were 61.2% males and 38.8% females. Maximum number of patients belonged to the age group of 1 month to 12months (55.2%) followed by age group of 12.1to 36 years (20.1%). The mean

length of stay (LOS) in the PICU was 7.42±7.72 days). The three most common disease categories admitted were respiratory diseases (32.3%) followed neurological disorders (17.0%), and Infection other than sepsis- (11.7%). 334 (27.1%) patients improved and were transferred to the paediatric wards, 514 (41.8%) were discharged directly from PICU, 257 (20.9%) died ,98 (8%) left against medical advice and 28(2.3) referral discharge were done.

**Morbidity pattern in total admission**

Diagnosis	Age Group											
	1-12 months			12.1-36 months			36.1-60months			>60 months		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Sepsis	62	35	97	7	9	16	3	1	4	4	7	11
Respiratory	207	92	299	38	24	62	11	4	15	10	12	22
Neurological	43	29	72	35	22	57	15	19	34	32	14	46
Renal	8	6	14	11	4	15	6	0	6	4	5	9
Hematological	13	10	23	6	12	18	11	8	19	28	20	48
Cardiological	42	31	73	4	6	10	4	0	4	4	2	6
Hepatic	8	1	9	2	0	2	1	1	2	1	4	5
Gastrointestinal	20	14	34	6	4	10	1	2	3	5	4	9
Poisoning	0	2	2	4	1	5	3	9	12	0	1	1
Infection other than sepsis	22	22	44	34	13	47	1	0	1	22	19	41
Immunological	3	2	5	1	1	2	1	0	1			
Endocrinological	2	2	4	3	0	3	57	44	101	3	1	4
Developmental	3	1	4	0	1	1						

Two hundred and fifty patients (20.9%of total admission) patients died during the period, consisting of 141 (54.9%) males and 116 (45.1%) females. Leading causes of death in this study were sepsis (n=74), respiratory (n=59), cardio-

logical (n=42) and neurological diseases (n=38). Maximum deaths 53 (35.6%) occurred in the age group 1month to 1 year. Mortality analysis in relation to different diseases is presented in Table 2.

**Mortality according to disease**

Diagnosis	Age Group											
	1-12 months			12.1-36 months			36.1-60months			>60 months		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Sepsis	33	20	53	6	6	12	2	1	3	3	5	8
Respiratory	26	19	45	4	3	7	2	1	3	1	3	4
Neurological	4	5	9	5	5	10	4	7	11	5	3	8
Renal	1	2	3				1	0	1			
Hematological	2	2	4	2	0	2	4	2	6	4	12	16
Cardiological	20	10	30	2	4	6	3	0	3	2	1	3
Hepatic	3	0	3				1	1	2	0	1	1
Gastrointestinal	1	1	2							0	2	2

## Discussion

The PICU is a special unit primarily concerned with the care of patients with critical illness and demands a broad-based knowledge to achieve good outcome. Advances in pediatric subspecialties including the critical care medicine have improved the survival of sick children. During the 30 months study period, 1231 children were admitted to the 10 bedded PICU (432 and 416 in each year) which is comparable to other tertiary level PICUs in the country.<sup>(7)</sup> Majority of the patients were males (61.2%) a finding similar to that of S. Shah and K. Shah and 47.4% were infants as recorded by Haque and Bano.<sup>(8,9)</sup> This study revealed that respiratory diseases (32.3%) followed neurological disorders (17.0%), and Infection other than sepsis- (11.7%) were the major causes of admission into the PICU. S. Shah and K. Shah reported respiratory illness (33%) as the commonest indication for admission, Blessing I reported cardiovascular disease (41.1%), as the commonest indication for admission in their series while a study from Pakistan found post cardiac surgery (34%) to be the most common condition.<sup>(9,10)</sup> This shows that paediatric intensive care admissions vary in different countries and one should be aware of the prevalent conditions to develop the facilities and prepare treatment protocols accordingly.

Overall mortality in this study was 20.9%. This value is higher than documented by Shah et al with the mortality rate (2.1%) and Choi et al with the mortality rate (2.6%) for a five-bed PICU in a general hospital in Hong Kong.<sup>(11)</sup> but close to the mortality in Pakistan. The reported mortality varied from 9.8-35% in different series by other authors.<sup>(12-15)</sup> The delayed arrival at our PICU because of the lack of information regarding set up of PICU within the last three years in different Government Hospital can be accounted for high mortality in our PICU. If children were received at earlier stage it could have resulted in change in current picture. Because data are being of first 2.5 years after starting of this PICU, future data on mortality will hopefully be a better one. To

enhance cost-effective management of patients and avoid unnecessary stretch of the ICU stay this situation needs to be addressed. This was one of the limitations of our study. The other limitation was inability to assess the severity scoring.

Based on our observation, it appears that care of patients in our PICU is somewhat similar to other tertiary level PICUs in the country. Pearson et al have suggested that the availability of full-time trained paediatric intensivists can deliver care of high quality and with much higher efficiency than without them in PICUs.<sup>(16)</sup> Protocol based management, rational antibiotic policy early referral to PICU to be implemented to have a low mortality .

## Conclusion

It was concluded that the demographic profile of patients including age, sex, source of admission and co morbidities follow a varied pattern in different PICU patients worldwide. A well-equipped intensive care unit with modern and innovative facilities along with the availability of fulltime trained paediatric intensivists made a significant impact on the outcome of critically ill children in our PICU.

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