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Original Research Article

Morbidity pattern and outcome of children admitted to a paediatric intensive care unit of Eastern India

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ABSTRACT

Background: In developing countries, there is scarce data on paediatric critical care. This makes modification of practices to improve outcome, difficult. The above study was done to highlight the lack of facilities and concept of pediatric critical in the eastern part of India so that modification of management can lead to better outcome of critically ill children.
Methods: A retrospective study of the demography, clinical profile, diagnosis, treatment and outcome of children admitted to the PICU of Kalinga Institute of Medical Sciences from January 2014 to December 2015 was done.
Results: A total of 848 children were admitted to the PICU with male and female children being 61.3% and 38.7% respectively. Diagnoses included infectious diseases (20.7%), respiratory disease (19.1%), central nervous system diseases (14.3%), cardiovascular diseases (10.8%), gastrointestinal diseases (7%), surgical problems (4.7%) haematological (4%), renal (3.3%), poisonings (1.4%), and others (14.3%). Out of 848 admitted children, 4.1% died and (1.4%) left against medical advice (8.5%) children received mechanical ventilation, among which (62.5%) improved, 34.7% died and 2.8% children left against medical advice. Multiorgan dysfunction syndrome (MODS) and co-morbidity were present in 25% and 22% respectively. The proportion of death among patients admitted to PICU was 4.1%.
Conclusions: The leading cause of admission was infectious and respiratory diseases. Children with MODS and co-morbidity had higher mortality. The overall mortality rate in our PICU was low. We conclude, a well-equipped intensive care unit with modern and innovative facilities leads to a good outcome.

Keywords: Clinical profile, Mortality, PICU

INTRODUCTION

The care of critically ill children remains one of the most demanding and challenging aspects in the field of paediatrics. Pediatric intensive care unit (PICU) aims at promoting early intervention and quality care with an objective of achieving good results and better prognosis. This can be achieved by well-equipped and well-staffed intensive care units.[1,2] But despite all measures, ICU is one of the sites where medical errors are most likely to occur because of the complexity of the diseases, and multiple interventions.[3,4] With the advancement in intensive care facilities, there is a dramatic increase in survival of critically ill children.[1,5] In critical care medicine, intensive care unit (ICU) results can be assessed on the basis of outcome such as mortality rate or survival. Evaluation of the outcome of medical interventions can assess the efficacy of treatment. This helps in better decision making, improving quality of care and modifying the future management if required. Mortality of patients depends on many factors such as demographic variables, clinical characteristic, associated

co-morbidities, infrastructure and availability of adequate staffs.

Pediatric intensive care is an emerging concept in the eastern part of India. This is the only PICU in Odisha with trained pediatric Intensivists working round the clock. Data of PICU in this part of the country is not available till date. Therefore, PICU data were analysed to find out the pattern of diseases and outcome at our centre which would help in modifying practices if necessary, leading to better management and outcome of critically ill children

METHODS

This study was a retrospective record based study which reviewed the admissions into the PICU of a tertiary care centre in Odisha for a period of 2 years from January 2014 to December 2015. The hospital has a well-equipped ten-bedded PICU, which admits paediatric patients upto18 years of age, from both medical and surgical subspecialties.

PICU records of all admissions, transfers out, discharges, and deaths were analysed. Data collected on patients included age, gender, diagnosis, 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.

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 or positive viral marker were included in infectious disease. Suspected sepsis cases included those patients who had systemic inflammatory response syndrome. (Tachycardia, tachypnoea, temperature >38.5 ºC or < 36 ºC, abnormal leukocyte count or >10% band cells.) Patients with tropical diseases (malaria/typhoid/dengue/scrub typhus) were also included in this group.

RESULTS

During the period of the study, a total of 848 patients were admitted into the PICU. There were 61.3% males and 38.7% females. Maximum number of patients belonged to the age group of 1 month to 1 year (47.4%) followed by age group of 1to 5 years (24.2%). The mean length of stay (LOS) in the PICU was 3.7±2.5 days (range, 0 - 28 days). The three most common disease categories admitted were infectious diseases (20.7%) followed by respiratory diseases (19.1%) and central nervous system diseases (14.3%). 596 (70.3%) patients improved and were transferred to the paediatric wards, 205 (24%) were discharged directly from PICU, 35 (4.1%) died and 12 (1.4%) left against medical advice.

A total number of 782 culture samples were sent out of which 35 (4.5%) samples were positive. Out of the 56 cases of sepsis, 15 (26.8%) had positive blood culture. Staphylococcus sepsis was the commonest blood stream infection. Out of the 72 patients who were mechanically ventilated, 4 (5.5%) had endotracheal secretions culture positive. The rate of nosocomial infection was 4.7% with acinetobacter from endotracheal secretions and staphylococcus aureus from central venous catheter as common isolates. Bloodstream infection from central venous catheter (mostly placed in femoral vein) and ventilator associated pneumonias were the main sites of infections in patients with nosocomial infections.

Table 1: Distribution as per morbidity pattern.

Condition	No. of patients	% of total admissions
Infections/sepsis	176	20.7
Respiratory	162	19.1
Neurological	122	14.3
Cardiovascular	92	10.8
Gastrointestinal	60	7
Surgical	40	4.7
Haematological	34	4
Renal	28	3.3
Poisoning	12	1.4
Others	122	14.3
Total	**848**	**100.0**

Table 2: Mortality according to disease.

Diseases	No. of cases	death n = 35 (%)
Sepsis	56	11(31.4)
Pneumonia	86	7 (20)
Encephalitis	51	7 (20)
Congenital heart disease	23	5 (14.3)
Leukemia	7	2 (5.7)
Aplastic anemia	5	1 (2.8)
Hepatic encephalopathy	1	1 (2.8)
Retinoblastoma	1	1 (2.8)

Thirty five (4.1%) patients died during the period, consisting of nineteen (59.3%) males and thirteen (40.6%) females. Leading causes of death in this study were sepsis with MODS (n=11), encephalitis (n=7), pneumonia (n=7) and congenital heart diseases (n=5). Maximum deaths 13 (37.1%) occurred in the age group 1

month to 1 year. Mortality analysis in relation to different diseases is presented in Table 2.

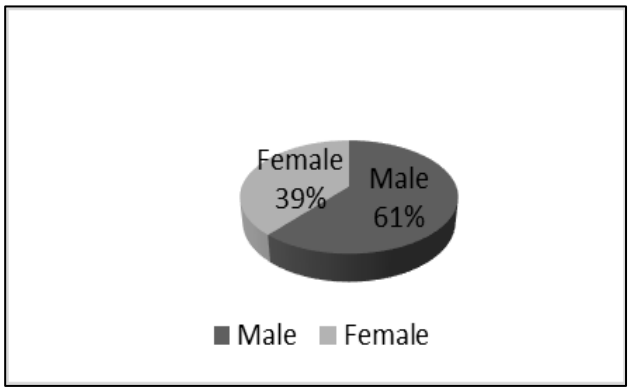

Figure 1: Gender distribution.

Common respiratory illnesses included pneumonia (n = 86, 53%), acute bronchiolitis (n = 40, 24.7%) and bronchial asthma (n = 32, 19.75%). Encephalitis (n = 51, 41.8%) followed by seizure disorders (n = 35, 28.7%) and meningitis (n = 11, 9%) were the common central nervous system diseases requiring PICU care. Other conditions requiring PICU admissions included acute gastroenteritis (n = 13, 76.4%), congenital heart diseases (n = 8, 53.3%), and poisoning (n = 4, 36.3%).

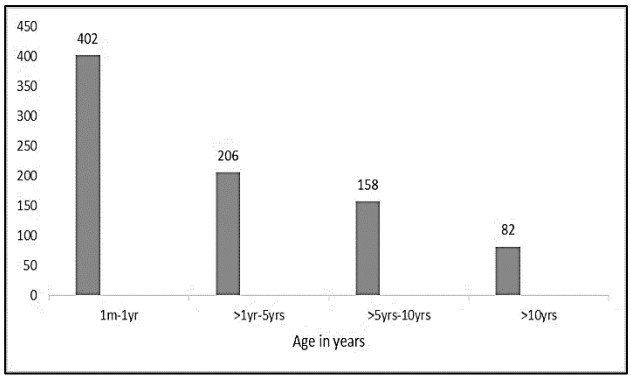

Figure 2: Age distribution of patients.

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.[6] Advances in pediatric sub-specialties including the critical care medicine have improved the survival of sick children. During the 24 months study period, 848 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.[7] Majority of the patients were males (61.3%) a finding similar to that of S. Shah and K. Shah and 47.4% were infants as recorded by Haque and Bano.[8,9] This study revealed that infectious diseases (20.7%), respiratory diseases (19.1%) and central nervous system diseases (14.3%) 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.[9,10] 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 4.1%, giving an ICU survival rate of 95.9%. 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.[11] It is, however, less than an overall mortality of 6.7% and 16.7% recorded in India by Khilnani et al and Bellad et al respectively.[12]

The reported mortality varied from 9.8-35% in different series by other authors.[13-15] 31.4% of non-survivors had multiorgan failure which is lower as compared to the study by Khilnani et al (49.5%). The average LOS (3.7±2.5 days) in PICU of the present study is similar to that of Iyoha et al but in contrast to mean duration of 4.52±2.6 days reported by Khilnani et al. The absence of a high-dependency unit at our centre led to the admission of some patients who were not ill enough to remain in PICU.

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. The low mortality rate in our PICU could be due to medical college affiliation with better resources availability, 24-hour physician coverage, highly trained-nurses, good nurse-patient ratio and presence of 4 trained paediatric intensivists. 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.[16]

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. The low mortality rate indicates optimal quality management of our patients. 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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