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Original Research Article

Pattern of admission and clinical outcome of patients admitted in pediatric intensive care unit of a rural tertiary health care centre

Vivek Parasher, Sachin Shaha, Rahul Khatri, Samarth Yadav*, Sayan Das, Ujjwal Mittal

Department of Pediatrics, Pacific Institute of medical sciences, Umarda, Udaipur, Rajasthan, India

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***Correspondence:**
Dr. Samarth Yadav,
E-mail: samarthyadav55@gmail.com

ABSTRACT

Background: In the treatment of critically ill children needing specialized airway, respiratory, and hemodynamic assistance, intensive care has become very necessary and is typically admitted into the pediatric intensive care unit (PICU) in order to ensure a better result than if the patients were admitted to other sections of the hospital. To audit admissions and their findings are significant, which may help to change procedures after extensive introspection if appropriate, leading to improved patient outcomes. Objective were to examine pattern of admission and clinical outcome of patients admitted in the pediatric intensive care unit of a rural tertiary health care centre.
Methods: Information retrieved included age, sex, diagnosis, outcome, morbidity and mortality profile of patients admitted in PICU in the last five years.
Results: A total of 2810 patients were admitted into PICU. (1444) 51.3% were infants, and (1366) 48.6% patients aged 1-18 years. Their ages ranged from one month to 18 years, with the mean age being 40.01 ± 45.79 months. There were 1948 (69.3%) male and 862 (30.3%) female patients giving an M: F ratio of 2.27:1. The overall mortality rate was 2.4%.
Conclusions: In our PICU, mortality is low. We believe that the treatment of critically ill patients with desirable results is significantly facilitated by a well-equipped intensive care unit with advanced and creative intensive care in order to improve cost-effective patient care and prevent needless stretching of the PICU services, an extension of the pediatric wards is advocated.

Keywords: Mortality, Morbidity pattern, Intensive care unit, Children

INTRODUCTION

In the treatment of critically ill children, intensive care has become very important. The pediatric intensive care unit (PICU) is part of the hospital where critically ill pediatric patients who need advanced airway, cardiac, and respiratory diseases and who need hemodynamic aids are widely admitted for the purpose of achieving a better result than admitting patients to other areas of the hospital. The treatment of the chronically ill is one of the most demanding and intimidating tasks. The primary objective of the PICU is intended to decrease mortality by intensively tracking and monitoring the care of children who are deemed chronically ill with high chances of death or coma. 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 an 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 make better decisions, to improve the quality of care further, to standardize conduct, and to ensure effective management of the high-level resources needed to deliver intensive care services, thereby optimizing resource utilization.[1]

Intensive care facilities are expensive, and consequently, availability is very often limited in developing countries. The selection of cases for admission is often challenging. Industrialized countries have utilized scoring systems such as the Paediatric Risk of mortality and the therapeutic intervention scoring system for admission, although the use of these in developing countries has been questioned due to the lack of concordance with the outcome.[2,3] The care of critically ill children remains one of the most demanding and challenging aspects of the field of paediatrics.

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 caregivers of patients. It is well known that growth in the economy of countries and the appropriate allocation of their national resources are often accompanied by an improvement in social conditions and a consequent transformation in the pattern of diseases.[4,5] This epidemiological transition of diseases is clearly visible for paediatric illnesses, with the dramatic decreases and eradication in some cases of vaccine preventable diseases.[6-8] The impact of these alterations are clearly visible in the admission patterns seen at paediatric intensive care units from first world countries where vaccine preventable diseases are no longer responsible for high admission burdens.[9-11] In the past two decades, improvements in life sustaining technologies resulted in an increase in the number of ICUs. Care of the critically ill patients is resource-intensive, and 15-20% of hospital budgets are spent in the ICUs. The focus on the quality and safety of medical care is increasing because of the high cost of healthcare and potential for harm.[12-14]

There are many evaluations of mortality and incidence of complications, such as nosocomial infections in the ICUs, with an increased emphasis on the quality improvement efforts and evaluation of outcomes.[15,16] In 1991, a survey conducted in the USA revealed that 8% of hospital beds are ICU beds, 10-12 beds per unit for adult ICU and 21 beds per unit for neonatal ICU. The occupancy rate was 84% and the category of ICU was either medical ICU (36%) or mixed (22%).[17]
This study was performed to check the pattern of admissions and their clinical outcome of patients admitted in pediatric intensive care unit among children of 1 month to 18 years of age. We, therefore, examined the records of all admissions over the past five years (2016 to 2020) in terms of the trend of admissions and outcomes in the PICU at the Pacific Institute of Medical Sciences.

Results that will be obtained can be used in future to change existing healthcare protocols and guidelines that will help in decreasing the morbidity and mortality rate among critically ill children. These findings offered by this study is likely to be of use to health planning and health providers.

METHODS

This is a retrospective study of the pattern of admissions into the PICU of a tertiary care centre known as Pacific institute of medical sciences and hospital in a tribal area called umarda in Udaipur district of Rajsthan in India from January 2016 to December 2020. The hospital is a tertiary care centre with medical college equipped with ten-beded modern PICU, which admits pediatric patients till 18 years of age from both medical and surgical subspecialties for immediate critical postoperative care, and are sometimes transferred to the pediatric wards only when they are stable. PICU records of all admissions, transfer out, discharges and deaths were used for this study. Data used from the records included age, sex, diagnosis, and outcome of all the patients admitted to PICU. The outcome is classified as transfers to pediatric wards, discharges, patients who left against medical advice (LAMA), and deaths. Ethical approval was given by the Ethics Committee of the hospital. The data obtained were entered into the Statistical Package for Scientific Solutions (SPSS) version 16.0 spreadsheet and analyzed. Means, standard deviations, percentages, and ranges were used as appropriate to describe continuous variables.

Inclusion criteria

All pediatric age group patients one month to 18years of age who were admitted to PICU.

Exclusion criteria

No exclusion criteria were considered in this study. All the pediatric age groups except neonates (0 to 28days old), whether Abscond/Referred/LAMA or any other related circumstances of whom the diagnosis was not known, were all included in the study.

RESULTS

In the period of last five years, a total of 2810 patients were admitted into PICU. (1444) 51.3% were infants, and (1366) 48.6% patients aged 1-18 years (Table 1). Their ages ranged from one month to 18 years, with the mean age being 40.01 ± 45.79 months. There were 1948 (69.3%) male and 862 (30.3%) female patients giving an M: F ratio of 2.27:1 (Table1). The most common cause of admission was surgical cases 1102 (39.2%), cardiovascular disorders 623 (22.1%), and respiratory disease 495 (17.6%) (Table 2). “Miscellaneous” 208 (7.4%) in Table 2 include rare and undiagnosed cases. Disorders needing surgical intervention were the commonest condition in children of all age groups (Table 2). A higher proportion of both males (59.3%) and females (40.6%) were admitted as cases needing surgical intervention (Table 3). Some of the common diseases for which patients were admitted were patients needing surgical intervention (39.2%), Pneumonia (17.3%), Sepsis (15.2%), Infectious diseases like dengue, malaria, scrub typhus etc. (15%), AGE with severe dehydration (8.4%), Seizure disorder (1.9%), Congenital

heart diseases (1.3%), Meningitis (0.8%), Nephrotic syndrome (0.4%), Poisoning (0.1%), Miscellaneous (0.4%) (Table4). 2632 (93.7%) patients improved and were transferred to the pediatric wards for further management and later discharged, and 110 (3.9%) left against medical advice (Table 5).

Table 1: Age groups and sex distribution of admitted patients.

Sex	Infants (28days to 1 year)	Pediatric age group (1-18years)	Total
Males (%)	881	1067	1948 (69.3%)
Females (%)	563	299	862 (30.3%)
Total	1444 (51.3%)	1366 (48.6%)	2810

Table 2: Causes of admission into PICU.

Condition	No. of patients	% of total admissions
Surgical cases	1102	39.2%
Cardiovascular	623	22.1%
Respiratory	495	17.6%
Neurological	382	13.5%
Miscellaneous	208	7.4%
Total	2810	100%

Table 3: Sex distribution among cases needing surgical intervention.

Males	Females	Total
654	448	1102
59.3%	40.6%	100%

Sixty-eight (2.4%) patients died during the period, consisting of forty-seven (69.1%) males and (30.8%) twenty-one females, with their mean age being 53.71 months (range, one month to 18 years). Eleven (16.4%) patients died in the postoperative period, thirty (41.1%) of cardiovascular disorders, ten (14.7%) of neurological problems, sixteen (26.4%) of respiratory disease, and one (1.4%) of hematologic concerns. The overall mortality rate was 2.4%. A higher proportion of males, 47 (69.1%), died following admission as compared to females, 21 (30.8%) (Table 6).

Table 4: Common diagnosis in PICU.

Sr. No.	Diagnosis	% of total admissions
1.	Patients needing surgical intervention.	39.2
2.	Pneumonia	17.3
3.	Sepsis	15.2
4.	Other infectious diseases	15
5.	Age with severe dehydration	8.4
6.	Seizure disorder	1.9
7.	Congenital heart diseases	1.3
8.	Meningitis	0.8
9.	Nephrotic syndrome	0.4
10.	Poisoning	0.1
11.	Miscellaneous	0.4

Table 5: Outcome of admitted patients.

Outcome	No. of patients	% of total admissions
Discharge and transfer out	2632	93.7
Lama/dama	110	3.9
Death	68	2.4
Total	2810	100

Table 6: Causes of death and sex distribution among them in PICU.

Cause of death	Male	Female	Total	% of total
Post-operative period complications	8	3	11	16.4
Cardiovascular dysfunction	21	9	30	41.1
Neurological dysfunction	7	3	10	14.7
Respiratory dysfunction	11	5	16	26.4
Haematological dysfunction	0	1	1	1.4
Total	47 (69.1%)	21 (30.8%)	68	100

Table 7: Final outcome of patients admitted in PICU.

Variables/diseases	Admission no. (%)	Survivors % of total survivors (2742)	Deaths % of total deaths (68)
Age			
Infants (1month to 1 year)	1444 (51.3)	1403 (50.2)	41 (60.2)
1 year to 18 years	1366 (48.6)	1339 (48.8)	27 (39.7)
Gender			
Male	1948 (69.3)	1915 (69.8)	33 (48.5)

Continued.

Variables/diseases	Admission no. (%)	Survivors % of total survivors (2742)	Deaths % of total deaths (68)
Female	862 (30.3)	827 (30.1)	35 (51.4)
Length of stay			
<48 hours	662 (23.5)	650 (23.7)	12 (17.4)
3 to 7 days	1563 (55.6)	1532 (55.8)	31 (45.5)
>7days	585 (20.8)	560 (20.4)	25 (36.7)
Diagnosis		**of survivors in particular disorder**	**% of deaths in a particular disorder**
Surgical cases	39.2	82.2	17.7
Pneumonia	17.3	77.7	22.2
Sepsis	15.2	61.5	38.4
Other infectious diseases	15	91.9	8%
Age with severe dehydration	8.4	88.5	11.5
Seizure disorder	1.9	81.3	18.6
Congenital heart diseases	1.3	70	29.9
Meningitis	0.8	67.7	32.2
Nephrotic syndrome	0.4	95.3	4.6
Poisoning	0.1	80.2	19.7
Miscellaneous	0.4	93.6	6.2

DISCUSSION

This study disclosed that patients needing Surgical intervention, cardiovascular and respiratory diseases were the foremost causes of admission into the PICU of our tertiary care centre. Criteria for admission into the unit are patients needing technological support like mechanical ventilation and/or invasive procedures. It includes patients who are critically ill who need intensive critical care that is not possible in general wards and post-surgical patients needing critical care. The fact that postoperative cases were the commonest (39.2%) cause of admission because the healthcare centre is a specialized pediatric surgery centre that provides surgical treatment for congenital as well as non-congenital disorders and their postoperative care in PICU. A special unit mainly dealing with the severely ill is the PICU. Treatment for critical disease patients needs a broad spectrum of expertise to address all aspects of critical disease management. In order to ensure a successful outcome for these patients, the key aim of the PICU is to avoid death by intensively tracking and treating critically ill children deemed to be at high mortality risk. While our patients covered the entire continuum from low to high-risk patients, our retrospective analysis could not objectively assess the seriousness of the conditions of our patients using tools such as the Pediatric Risk of Mortality (PRISM) and the Pediatric Mortality Index (PIM) because they were not used from the start and were not part of the medical records. The ability to measure the risk of death of patients is very significant because such estimation will be helpful in achieving several different objectives, such as assessing the prognosis of patients, the efficiency of ICUs and the use of ICU resources, as well as evaluating treatments, monitoring and matching the seriousness of the disease in clinical trials. In order to address the lack of continuity, reliability and precision in the subjective opinions of physicians about patient status and in response to increasing focus on the assessment and monitoring of health services, quantitative clinical scoring schemes have been created. Kapil and Bagga recorded lower mortality (9.8%) in long-stay patients (patients who stayed for more than 13 days) than in short-stay patients (24.6%). In this study, there was no significant relationship between LOS and outcome, as was documented by Patil in the year 2012.[18,19] The severity of illness before ICU admission and the presence of co-morbid conditions are also significant factors in patient survival. Our observed mortality rate was low. Important factors that may have contributed to survival in these patients include adequate manpower and equipment and provision of continuing medical education on pediatric critical care from time to time for staff by the institution. In a similar study conducted by Blessing I. Abhulimhen-Iyoha, it was shown that the foremost reasons for being admitted to their PICU were cardiovascular followed by neurological and respiratory; their findings are somewhat similar to ours except that our major portions of admissions were of operative cases. This is because our hospital had the facility for cost-effective and specialized pediatric surgery.[20] Cases of congenital malformations needing surgical intervention constitute a sizeable proportion of admissions into our PICU. The mortality rate in the postoperative period was rather low because, in PICU, we can provide specialized pediatric care to patients whose surgery has been performed by a specialized pediatric surgeon. This shows that a well-equipped PICU with paediatricians and nursing staff specially trained in pediatric care is very much necessary in a hospital in which pediatric surgeries are being performed. This study included a large amount and a variety of patients. Despite the large sample size, this study is limited by the fact that it is a single centric study, the results of which will not show the admission pattern

among entire generalized population of various areas. This study was conducted in a rural tertiary care centre located far away from city in a tribal area, hence results of this study will not show pattern among Urban population and developed areas of country.

CONCLUSION

In our PICU, mortality is low. We believe that the treatment of critically ill patients with desirable results is significantly facilitated by a well-equipped intensive care unit with advanced and creative intensive care in order to improve cost-effective patient care and prevent needless stretching of the PICU services, an extension of the pediatric wards is advocated.

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