Original Article

Admission Pattern and Outcome of Patients Admitted to Pediatric Intensive Care Unit, CMH, DHAKA: 2-Years Study

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Abstract:

Background: The care of critically ill children remains one of the most demanding and challenging aspects in the field of pediatrics. The main purpose of the pediatric intensive care unit (PICU) is to prevent mortality of these children by intensive monitoring, early intervention and quality care with an objective to achieve better prognosis than the patients admitted in other parts of the hospital. Pediatric intensive care is an emerging concept in Bangladesh with only a few PICUs mostly in the capital city, Dhaka. This study was conducted to find out the pattern of diseases and outcome at our centre which would help in better understanding, modifying practices if necessary, leading to better management and outcome and necessary resource allocation by the planners. **Methods:** It was a descriptive study conducted over 2 years, from October 2018 to September 2020, including all patients admitted to PICU of Combined Military Hospital, Dhaka. Bangladesh. Total 730 patients were admitted during the study period. Data were extracted from the patient's files including demographic and clinical characteristics, previously diagnosed chronic conditions and outcome including length of stay (LOS) or death were noted. **Results**: Total 730 patients were admitted during the study period. Mean age of the patient was 4 months and 4.68 days and mean hospital stay was 4.37±0.5 days. Preschool children (1–5 years of age) were the largest age group (n = 313). November and December were the most common months of admission (n = 58 and 57, respectively). Total 658 (90.1%) patient were improved and discharged, 32 (4.4%) patients were referred to surgical department, 3 (0.4%) patients was discharged against medical advice (DAMA) whereas, unfortunately 37 (5%) patients died. Central nervous system was involved in 198 (27.1%) and skin was the least involved system. A higher portion of patient of Preschool (1-5yrs) 15 (4.8%) died compared to <1 yr and > 5 years but the relationship was not significant statistically (p = 0.101). A higher proportion of males, 23 (5.2%), died compared to females, 14 (5%). This relationship was not statistically significant (p = 0.706). A higher proportion of death also observed in LOS< 24 hours, but the relationship was not significant (p=0.168). **Conclusion:** This study revealed that neurological, genetic defect and respiratory diseases were the major causes of admission into the PICU with survival rate of 95%. A PICU is an essential part of hospital caring for the critically ill child by reducing morbidity and mortality. An effective and well-equipped PICU with modern facilitates can bring out the desirable outcome.

Key words: PICU, mortality.

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Introduction:

While 10–20% of sick children will be referred to a hospital, the delay in recognition, late presentation, lack of resources, and severity of illness make the first 24 hours of hospitalization the most vulnerable period with one-third of patient deaths occurring during this time. In order to reduce global under five mortality in less developed countries, effective pediatric emergency and critical care services is very essential.[1] The care of critically ill children remains one of the most demanding and challenging aspects of the field of pediatrics[2,3,5]. The main purpose of the pediatric intensive care unit (PICU) is to prevent mortality by intensive monitoring and treating children who are considered at high risk of mortality.[2] PICU aims at promoting early intervention and quality care with an objective of achieving good results and better

prognosis than the patients admitted in other parts of the hospital.[3,4] Intensive care has become very important in the management of critically ill children who require advanced airway, respiratory, and hemodynamic supports.[4] Patients are admitted to a PICU because they require a very high level of monitoring of vital signs and other body functions[5]. These patients may need mechanical ventilation, invasive intravascular procedures and frequent attention by both the nursing and medical staffs[5]. Intensive care is predominantly concerned with the management of patients with acute life threatening conditions in a specialized unit.[3,5]

A PICU is a unit of in a hospital, where most critical children receive pediatric care. When compared to other units providing care in a hospital, a PICU has a higher professional: patient ratio and is better equipped with advanced monitoring systems and devices supporting dysfunctional organs[6]. Children having acute neurological deterioration, respiratory distress, cardiovascular compromise, severe infections and accidental poisoning constitutethe major admission to a PICU.[5] Patients may be discharged or ambulated from PICU once the disease process has reversed itself and care can be provided in less intense environment.[5]

With the advancement in intensive care facilities, there is a dramatic increase in survival of critically ill children.[3,7] This can be achieved by well-equipped and well-staffed intensive care units.[3] This, however, comes at a huge cost to all the parties involved—the hospital, the personnel, and the care givers of patients.[2] Since these patients are critically ill, the outcome of intervention is some¬times difficult to predict.[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 patients are vulnerable to experience adverse outcomes due to multiple interventions. Previous studies have shown significant positive impact of ICU physicians on the outcome in both children and adults.[3,7] 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.[4]

In critical care medicine, intensive care unit performance can be evaluated based on survival outcomes,such as "death" or "survival" by means of indicators such as mortality rates.[1,2,3,6] 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 man¬agement of the high-level resources needed to deliver inten-sive care services thereby optimizing resource utilization.[1,2,3,6]

Mortality of patients depends on many factors such as demographic variables, clinical characteristic, associated co-morbidities, infrastructure and availability of adequate staffs.[3]

Disease pattern in PICU particularly in early age group is a sensitive indicator of the availability, utilization and effectiveness ofmother and child health services in the community[5]. Disease pattern changes between different places and time to time even at the same place. Therefore, regular review of the disease pattern in any particular setting is important for providing better services to the patients.[5]

An PICU is a specially staffed and equipped, separated area in a hospital, dedicated to the management of patients with life-threatening illnesses.[8] Intensive care could reduce mortality rates by 15-60%, when it is a well-equipped, and staffed with intensivists.[8] Pollack et al., showed a better outcome of PICU patients in units where there was a pediatric intensivist and/or a pediatric intensive care fellowship programme.[4,5] Moreover, there are references that support better outcome of PICU patients in tertiary centers, which led to the developmentof a centralized system of PICUs worldwide.[9] Severity of disease of hospitalized patients has increased over the past decade, and advanced techniques have allowed such patients to stay alive.[10]

Pediatric intensive care is a relatively new and an emerging concept in Bangladesh. There are only few PICUs in Bangladesh and most of them are located within the capital city Dhaka. Although mortality in patients depends on many factors like 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.Data of PICU in this country is not available till date. We, therefore, analyzed the data of our PICU (a tertiary teaching hospital) to find out the pattern of diseases and outcome at our centre which would help in better understanding, modifying practices if necessary, leading to better management and outcome and necessary resource allocation by the planners. This study will provide a baseline data for future reviews and call the attention of health workers and planners to give due attention to improving the out-come of care in critically ill children.

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Methods:

Study design

It was a descriptive study conducted over 2 years, fromOctober 2018 to September 2020, including all patientsadmitted to PICU of Combined Military Hospital, Dhaka. Bangladesh.

Study settings

All indicated patients from 1 month to 12 years of age are admitted to this unit. The PICU is staffed 24/7by a team of highly skilled pediatric intensivists.

Data collection

Data were extracted from the patient's files filled byresident. Extracted data included the following:

(1) Demographic characteristics: age, sex, andadmission date.
(2) Clinical characteristics: provisional diagnosis andoutcome.
(3) Patients with previously diagnosed chronic conditions were noted.
(4) The outcome including length of stay (LOS), referral to general ward, or death was also noted.

Data analysis

Data were tabulated and analyzed using frequencyand percentage. Nominal data were compared usingthe Chi square tests. P values less than 0.05 were considered significant. SSPS ver 20.0 was used to do the statistical analysis.

Results:

Total 730 patients were admitted during the study period. Mean age of the patient was 4months and 4.68 days and mean hospital stay was 4.37±0.5 days.

Table-I: Demographics of patients admitted to PICU

Characteristics	**Frequency (%)**
Age	
<1yr	157 (21.5%)
Preschool (1-5yrs)	313 (42.9%)
>5yrs	260 (35.6%)
Mean	4months and 4.68 days
Sex	
Male	445 (60.9%)
Female	285 (39.1%)
Length of stay (LOS)	
<24 hours	116 (15.9%)
1-7days	113 (15.5%)
>7-30 days	495 (67.8%)
>30 days	6 (0.8%)
Average	4.37±0.5 days
Outcome	
Survived	658 (90.1%)
Referred to Surgical department	32 (4.4%)
DAMA	3 (0.4%)
Died	37 (5%)

Table I shows demographics of patients admitted to PICU, including their distribution according to age, sex, date of admission, LOS, and outcome. Preschool children (1–5 years of age) were the largest age group admitted to PICU (n = 313). November and December were the most common months of admission (n = 58 and 57, respectively)Total 730 patients were admitted during the study period, out of them 658 (90.1%) patient were improved and discharged, 32 (4.4%) patients were referred to surgical department, 3 (0.4%) patients was discharged against medical advice (DAMA) whereas, unfortunately 37 (5%) patients died.

Table-II: Involved system of patients admitted to PICU

System	Number of patients (Percentage)
CNS	198 (27.1%)
Genetic disorders	166(22.7%)
Respiratory System	161 (22%)
Gastrointestinal System	105(14.9%)
Hematology	35(4.8%)
Renal	33(4.5%)
Oncology	9(1.2%)
Cardiovascular system	8(1%)
Endocrine system	6(0.8%)
Rheumatology	6(0.8%)
Dermatology	3(0.4%)

Table II shows primary system involved in the patient admitted in PICU. Central nervous system was involved in 198 (27.1%) and skin was the least involved system.

Table-III: Demographic variable and outcome following admission of patients

Characteristics	Outcome following admission. n(%)		*p* valve
	Survival	Death	
Age			
<1yr	149 (94.9%)	8 (5.1%)	0.101
Preschool (1-5yrs)	298 (95.2%)	15(4.8%)	
>5yrs	246 (94.6%)	14 (5.4%)	
Sex			
Male	422 (94.8%)	23(5.2%)	0.706
Female	271(95%)	14(5%)	
Length of stay (LOS)			
<24 hours	110(94.8%)	6(5.2%)	0.168
1-7days	107(94.7.5%)	6(5.3%)	
>7-30 days	471 (95.3%)	24 (4.7%)	
>30 days	5 (83.3%)	1(16.7%)	

Table III shows the relation between the demographic variance and mortality. A higher portion of patient of Preschool (1-5yrs) 15(4.8%) died compared to <1 yr and > 5 years but the relationship was not significant statistically (p = 0.101). A higher proportion of males, 23 (5.2%), died compared to females, 14 (5%). This relationship was not statistically significant (p = 0.706). A higher proportion of death also observed in LOS < 24 hours, but the relationship was not significant (p = 0.168).

Discussion:

This study revealed that neurological, genetic defect and respiratory diseases were the major causes of admission into the PICU of the tertiary care center studied. As the center we studied had a separate Pediatric cardiac ICU so cardiac admission was less in this study, otherwise it would have entered in the top list.

The PICU is a special unit concerned with the care of children with critical illness and demands a broad knowledge base to cater for all sorts of management of these patients to achieve good outcome.[11] The main purpose of PICU is to prevent mortality by intensively monitoring and treating critically ill children who are considered at high risk of mortality. The ability to assess patient risk of death is very important since such estimate would be beneficial in realizing patient's prognosis, ICU performance, and ICU resource utilization, and also evaluating therapies, controlling, and matching severity of illness in clinical studies.[12] Quantitative clinical scoring systems have been developed, like the Pediatric Risk of Mortality (PRISM) and the Pediatric Index of Mortality (PIM) to overcome the lack of consistency, reliability, and accuracy in physician's subjective opinions concerning patient status as well as in response to increasing emphasis on the evaluation and monitoring of health services.[11]

Thirty seven (5%) patients died during the course of admission, giving an ICU survival rate of 95%. This value is in consonance with theoverall mortality of 6.7% recorded in India by Khilnani et al.[13] ICU mortality rate varies depending on the case mix, age, LOS, and organisational aspects of the unit.[14] Our observed mortality rate was low, may be because of adequate manpower and equipment and provision of continuous institutional medical education on pediatric critical care for the staff.

Although some studies reveal that there is correlation between LOS and outcome of pediatric patients,[15] others show no relationship.[16] In this study, there was no significant relationship between LOS and outcome was documented. Patient survival also depends on factors other than LOS like severity of illness before PICU admission and presence of co-morbidity.

The duration of stay in the PICU is an index of severity of morbidity, the health-related quality of life in or out of hospital.[17] It is affected by previous health status and residual disability. In this study, the mean duration of stay in PICU was 4.37±0.5 days, which is similar to the records of a mean duration of 4.52 ± 2.6 days was reported by Khilnani et al.[13] and 3.2 ± 4.5 days Blessing et al.[2] APICU is an essential part of hospital caring for the critically ill child by reducing morbidity and mortality. An effective and well-equipped PICU with modern facilitates can bring out the desirable outcome.

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