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Original Article

Primary indication for admissions to a multi-specialty paediatric intensive care unit in Sri Lanka

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Abstract

It is critical to analyse the pattern of admissions made to a multi-specialty ICU (Intensive Care Unit) facility in order to enhance the standard of care, update resources, and to train the PICU (Paediatric Intensive Care Unit) personnel. Policymakers, funders, healthcare practitioners and administrators must be aware of the epidemiology and patterns of ICU admissions improve existing health services and plan for future delivery of intensive care.

Objectives was to describe the primary indication for admissions to a multi-specialty Paediatric Intensive Care Unit of Teaching Hospital, Karapitiya, Sri Lanka.

Children from birth to 16 years of age treated in the PICU from 1st April 2022 to 31st March, 2023 were retrospectively analysed. Information was collected on age, sex, home town, mode of admission, primary specialty indication, length of stay, main system involved, requirement of mechanical ventilation and survival.

A total of 341 children were admitted and were included in the study. 60.5 % of the study population were males. Transfers within hospitals (62.1%) outnumbered transfers outside hospitals (37.9%).The average PICU stay was 5.8 days. Respiratory illnesses accounted for 54.4% of medical admissions and was the most common reason for intensive medical care. Other indications included neurological problems (21.3%) and multi-organ sepsis (8.4%). Leading cause of surgical specialty admissions was post-operative care (80.8%). Overall survival rate was 87.9% and mortality rate was 12.1%. Respiratory and neurological problems and multi-organ sepsis were the most common reasons for medical admission to the PICU. Leading cause of surgical specialty admissions was post-operative care. Overall survival rate was 87.9%.

Key words

PICU, Survivors, Mortality rate, Karapitiya

Introduction

Paediatric Intensive Care Unit (PICU) is a specialised treatment facility that provides intensive care including essential life support measures to seriously ill children (1). The main goal of a paediatric intensive care unit is to lower mortality and morbidity of critically ill children by careful monitoring and optimal management of those who are thought to be at high risk of dying. Paediatric intensive care not only improves survival of seriously ill children but also aims to enhance their quality of life (2).

Teaching hospital Karapitiya is the largest hospital in Southern Province of Sri Lanka. It is the third largest hospital in country. Paediatric Intensive Care Unit at Teaching Hospital Karapitiya is a seven bedded multi-specialty intensive care facility. The unit receives admissions from all regions of Sri Lanka around the year depending on the availability of beds. Patterns of admissions to Paediatric Intensive Care Units are known to vary around the world (3). In order to determine the health policies related to paediatric intensive care, it is essential to comprehend the pattern of clinical presentations and the epidemiological profile of children admitted to PICUs.

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This retrospective study aimed to assess the patterns of clinical presentations, primary indication for the admission and epidemiological profile of children who received intensive care at PICU, Teaching Hospital Karapitiya.

Methods

This single center, retrospective study was conducted at the multi-specialty PICU of Teaching Hospital Karapitiya, Sri Lanka. All children who were admitted and treated at PICU Teaching Hospital Karapitiya from 1st April 2022 to 31st March, 2023 for a period of one-year were included in the study. The study instrument was a structured check list that assessed information including patients' demographic information (age ,gender and hometown), primary indication for admission, mode of admission, ventilation status, outcome of patients, and the mean length of stay in PICU. Monthly patterns of admissions were also studied. Information was collected from the relevant medical records from medical records department following due permission from the Medical Director, Teaching Hospital Karapitiya. Additionally, data was also collected from admission and discharge registers at the PICU. Extended BHTs (Bed Head Ticket) entered as duplicate entries were excluded from the study. All data were collected by medical graduates. The administrative approval to access data from the medical records department was given by the Director, Teaching hospital, Karapitiya. Only the deidentified information was collected as per the study protocol. Abstracted data were entered on google forms and the data were analysed on an MS Excel 2020 spreadsheet. The main quantitative variables considered in the analysis were primary indication for admissions and the outcomes.

Results

A total of 341 patients had been admitted to the PICU, Teaching Hospital Karapitiya during the one-year study period. The total number of patients admitted to the PICU during each month period is summarized in Figure 1. The month of October reported the highest number of admissions to the PICU. Mean length of stay was 5.8 days. Table 1 shows the age and gender distribution of the study population.

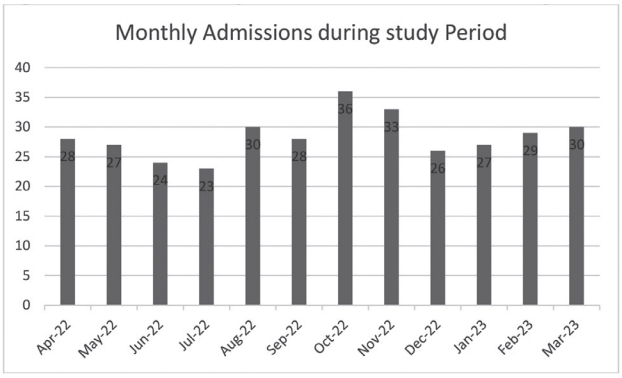

Figure 1 – Pattern of monthly admissions to the PICU around the year

Table 1 : Gender and age distribution of study population

Age group	Male	Female	Total
Less than 1 month	2	1	3(0.9%)
1 month to 12months	72	39	111(32.5%)
12 months to 24 months	23	18	41(12%)
2 years to 5years	44	31	75(22%)
5years to 12 years	50	40	90(26.4%)
Above 12 years	15	6	21(6.1%)
Total	206(60.4%)	135(39.6%)	341

Infants from one month to one year accounted for highest number of admissions (111, 32.5%). Approximately, two thirds of children were less than 5 years. Since this intensive care facility was located in Southern province, over 80% of benefited children resided in that province. Figure 2 shows the breakdown of the study population based on their residing province.

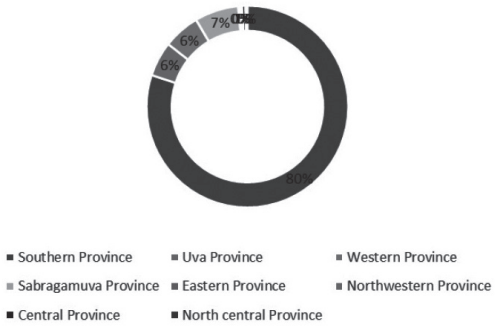

Figure 2: Distribution of the study population according to the province of residence

Two thirds of the treated children were having medical specialty related conditions (Table 2).

Table 2: Distribution of study population based on the specialty of the primary indication

Specialty	Male	Female	Total
Medical specialty related	131	95	226(66.3%)
Surgical specialty related	75	40	115(33.7%)
	206	135	341

A surgical specialty admitted every third child to the PICU. There is no statistical correlation between specialty-related diseases and gender (p value-0 .1954). Table 3 illustrates the system-wise breakdown of the medical specialty related admissions.

Table 3 : Distribution of medical specialty related admissions based on the affected body system

Primary medical specialty related indication	n(%)
Respiratory disorders	123(54.4%)
Cardiovascular disorders	11(4.9%)
Neurological disorders	48(21.3%)
Renal disorders	6(2.7%)
Hepatobiliary disorders	2(0.9%)
Infections	10(4.4%)
Multisystem sepsis	19(8.4%)
Hematological disorders	1(0.4%)
Accidental Poisoning	1(0.4%)
Snake bite	3(1.3%)
Drowning	1(0.4%)
Plasmapheresis	1(0.4%)
	226

All seriously ill children were cared for in the PICU, regardless of the system or organ affected. The type of organ or system implicated at the time of admission to the PICU is shown in Table 3. The three main systems that led to the majority of PICU admissions were respiratory illnesses, neurologic disorders, and multisystem sepsis. More over half of the PICU admissions were due to respiratory system-related reasons. The second most common reason for hospitalisation, accounting for 22% of cases, was neurological diseases.

Out of the 115 primary surgical admissions, 59 (51.3%) involved pediatric surgical post-operative care. Post-operative neurosurgical cases, which accounted for 26.9% of cases, were the second most frequent surgical cause of PICU admission. The breakdown of the surgical indications is shown in Table 4.

Table 4 : Pattern of admissions in surgical specialties

Primary indication	n(%)
Postoperative care (Paediatric Surgery)	59(51.3%)
Postoperative care(Oral and maxillary surgical Unit)	3(2.6%)
Postoperative care(Neurosurgery)	31(26.9%)
Road traffic accidents (RTA)	10(8.7%)
Trauma (Non-RTA)	10(8.7%)
Burns	2(1.7%)
	115

47.5% of children in the current study needed mechanical ventilation during their PICU stay. Specialty and the need for ventilation were statistically significantly correlated (p value - <0.0001) (Table 5).

Table 5 : Requirement of mechanical ventilation amongst medical and surgical specialties

Specialty cases	Requirement of Mechanical Ventilation		
	Yes	No	
Medical Specialty	84	142	226
Surgical specialty	78	37	115
	162(47.5%)	179(52.5%)	341

The outcomes of in-hospital and out-of-hospital transferred patients who were sent to the PICU are shown in Table 5. Overall, in-hospital transfers had a mortality rate of 10.3%, whereas referred out-of-hospital transfers had a mortality rate of 14.8%. For both types of admissions, the overall survival percentage was more than 85%. Mode of admission and survival were not statistically significant (p value -0.214).

Table 5: Outcomes of admissions during study period

	In-hospital patients	Out-of-hospital transfers	Total
Non-Survivors-n(%)	22(10.3%)	19(14.8%)	41(12%)
Survivors-n(%)	191(89.7%)	109(85.2%)	300(88%)
	213(62.5%)	128(37.5%)	341

Discussion

Pediatric Intensive Care Units (PICU) are crucial for treatment of seriously ill or injured children (4). The care that is given within an ICU includes meticulous and careful monitoring of critically ill children and sustaining crucial organ function (5). Infants from one month to one year accounted for the highest number of admissions (111, 32.5%) in the current study as a single age group. This finding was comparable to research from Sri Lanka and around the world (6,7,8). Only three neonates were admitted to the PICU in the current study since the neonates were in general admitted to the Neonatal Intensive Care Unit. More than two thirds (67.4%) of all PICU admissions were children under the age of five years. Both the studies performed at the Lady Ridgeway Hospital, Colombo and Brazil observed comparable results (6,7). A male predominance was also observed in our study and other studies reported comparable results (9).

Our study found that the three most frequent medical indications for admission to the PICU over the course of the year were respiratory illnesses (54.4%), nervous system related disorders (21.3%), and multi-system-sepsis (8.4%). This observation was consistently seen in other Sri Lankan studies(10). In contrast to the study done at the Lady Ridgeway hospital, Colombo, we observed neurological disorders as the second most common medical indication. According to an Indian study, cardiovascular disease was the most frequent reason for PICU admission, followed by neurological and respiratory conditions (11). In our analysis, cardiovascular disorders were the fourth most common reason for PICU admission. Multisystem sepsis was common in as a primary indication in several studies despite the wide variety of PICU patients' medical indications (12).

A notable number (115) of surgical patients were admitted to the PICU for intensive care. Pediatric intensive care unit beds are used for surgical patients in the absence of a dedicated pediatric surgical intensive care unit. Only 1.2% of admissions were related to surgical speciality in the study performed at the Lady Ridgeway hospital where dedicated surgical ICUs are available for care of children admitted following primary surgical indications. Multi-speciality ICU at Teaching Hospital Karapitiya, however, accommodates surgical patients due to lack of available of a surgical ICU for children. In a study from Pakistan, by Haque A., et al, the number of admissions for surgical and medical specialties was identical5. More than two thirds of admissions in a study from Nigeria, according to Adamu S. Abubakar et al, were related to primary surgical indications13. In another Sri Lankan study by S P Mudalige et al., 43.5% of paediatric admissions were for providing postoperative surgical care (11).

Mechanical ventilation is a life-saving technique in order to support the cardiorespiratory functions until the underlying disease is treated. With the advent of several innovative ventilation techniques, invasive mechanical ventilation is continuously evolving. The Paediatric Intensive Care Units (PICU) have a mechanical ventilation rate of between 30% to 64% of admitted children in some studies(14). The current study observed that mechanical ventilation accounted for 47.5% of all patients admitted to the PICU. The value exceeds ventilation rate reported in a study from in Nepal (30%)15 and Ethiopia (16). One reason why the ventilation was higher in the current study was that the unit was receiving critically ill children for ventilatory support from other tertiary care hospitals and specialised treatment facilities from around the country. A mortality rate of between 5% and 14% has been reported by studies conducted in hospitals in South Asia (17). The morality rates reported in Sri Lankan studies were 13% and 22.7% (6,8). The mortality rate in the current study was 12%.

Conclusion

Respiratory and neurological problems and multi-organ sepsis were the most common reasons for medical admission to the PICU. Leading cause of surgical specialty admissions was post-operative care. Overall survival rate was 87.9% and it was comparable with other studies from Sri Lanka and South Asia.

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