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Case distribution and survival rate in Pediatric Intensive Care Unit (PICU) at Banjarmasin, Indonesia



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Choirul Anam^{1*}, Niarsari Anugrahi Putri¹,
Rahmad Ramadhani¹, Yasmin Musfirah¹

¹Department of Pediatrics, Ulin Hospital, Banjarmasin, South Borneo, Indonesia

*Corresponding to:
Choirul Anam; Department of Pediatrics,
Ulin Hospital, Banjarmasin, South
Borneo, Indonesia;
anam_dr86@yahoo.com

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ABSTRACT

Introduction: Epidemiological studies about case distribution and survival in PICU is important to do. Knowledge of these epidemiological studies can assist in decision-making to improve patient quality of care. So far there is no data about the case distribution and survival rate of the patients in the PICU in Banjarmasin, Indonesia. This study aims to provide an overview of case distribution and survival rates of patients treated at the PICU of Ulin Hospital Banjarmasin.

Methods: A retrospective study was conducted at the PICU of Ulin Hospital Banjarmasin. Data was taken from patients' records from January 2017 to December 2018.

Results: A total of 202 patients were admitted to the PICU, males 109 and females 93. The mortality rate was 17% with a survival rate, 83% with a mean length of stay of 10 days. The most common patient diagnosis was pneumonia 23%, meningoencephalitis 10%, and dengue shock syndrome 6%. The system commonly involved was respiratory system 26%, central nervous system 17%, and infection 13%. The median length of stay for overall admission was 9 days with a mean of 10 days. The cardiovascular and respiratory systems tend to have lower survival rates, 78%, and 79% respectively.

Conclusions: This study shows that respiratory, neurological, and infectious diseases are the most common diseases that cause children to be admitted to the PICU. The mortality rate in this study was 17% with a mean length of stay of 10 days. It is necessary to focus on medical facilities and interventions to reduce respiratory-related mortality.

Keywords: Case distribution, cause of death, epidemiological studies, PICU.

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INTRODUCTION

The pediatric intensive care unit (PICU) is a specialized unit designed primarily to provide qualified care for critically ill children that extends beyond its walls to include emergency department, wards, and prehospital settings. Epidemiological studies that focused on case distribution and survival in PICU are important to do. Knowledge of epidemiological reports concerning the case distribution and mortality of a health care unit can assist in strategic decisions aimed at improving patient quality of care. There are many studies documenting case distribution and outcome of PICU from western countries but very few such studies are available from the developing countries.¹⁻³

Studies in the United Kingdom by Brooten et al on 2016 reports that

patients treated in the PICU mostly suffer cardiovascular disease followed by respiratory and neurological. However, respiratory disease is the cause most frequent for treatment in the PICU room. In Ethiopia, the most common cause of admission is septic shock and severe sepsis or multiorgan failure was the leading cause of death following respiratory failure, brain herniation, and cardiac arrest. The patient survival rate in PICU around the world is about 75% per year, while the patient survival rate at PICU in America is approximately 80% of patients. So far there is no data about the case distribution and survival rate of the patients in the PICU in Banjarmasin, Indonesia. This study objective is to provide an overview of the case distribution and the survival rate of patients treated at the PICU RSUD Ulin Banjarmasin.⁴⁻⁶

METHODS

Study Design

This research is a retrospective descriptive study that falls into observational research and cross-sectional research category. This research employs an approach namely qualitative analysis.

Sample collection and characteristics

The research populations were taken from the PICU of Ulin Hospital Banjarmasin, South Borneo, Indonesia. Patients that were taken as samples aged more than 28 days to 18 years old and had complete data recorded.

Data collection and analysis

The data collected in this study was secondary data. Data was taken from patients records during the study period

January 2017 until December 2018. The data analyses are done by using univariate analysis which showed in the form of frequency tables.

RESULTS

During January 2017 to December 2018, a total of 202 patients were admitted to the PICU. The majority was male 109 and 93 were females. The mortality rate was 17% with a survival rate of 83% with a mean length of stay of 10 days (Table 1).

The most common patient diagnosis in this study was pneumonia 23%, meningoencephalitis 10%, and dengue shock syndrome 6% (Table 2). The system commonly involved was central nervous system 17%, respiratory system 26%, and other common causes were infection 13%.

In this study, the mortality rate was 17% with characteristics shown in Table 3. The majority were male, the mean length of stay was 10 days, and the most common disease was pneumonia.

The median length of stay for overall admission was 9 days with a mean of 10 days. There are six patients (3%) that had prolonged length of stay (>28 days). Patient with allergy and immunology, nephrology, and endocrine disease had a longer mean length of stay. From the system involved, cardiovascular and respiratory tend to have lower survival rates, 78%, and 79% respectively (Table 4).

Among 202 patients (Table 5), 57 patients had thrombocytopenia incidence of 28.2%. Dengue infection was the most common disease (35%) while the other thrombocytopenia's were sepsis (22.8%), central nervous system infection (19.3%), haematology disorder (12.2%), others (10.7%). Among 34 death patients, 8 patients had thrombocytopenia (23.5%).

C-Reactive Protein (CRP) was checked to 53 patients, 90% had result above the cut-off point (> 10 mg/l). Sepsis (60.4%) was the most common disease (96.7%), while other were pneumonia (18.7%), dengue infection (14.6%), and non-infection (6.3%). The mortality rate was higher in patients who had an increase in CRP (38.7%).

DISCUSSION

During the study period, 202 children were admitted to the PICU department,

Table 1. Sample characteristic

Sample	N (%)
Gender	
Male	109 (54)
Female	93 (46)
Outcome	
Survived	168 (83)
Death	34 (17)
Length of stay (mean±SD)	10 (±7)

Table 2. Patient Diagnosis

Diagnosis	n(%)
Pneumonia	47 (23)
Meningoencephalitis	21 (10)
Dengue Shock Syndrome	12 (6)
Dengue Fever	8 (4)
Acute Kidney Injury	6 (2)
Anemia gravis	10 (5)
Sepsis	7 (3)
Chronic Kidney Disease	5 (1)
Others	86 (42)

Table 3. Mortality characteristic

Sample	N (%)
Gender	
Male	19 (56)
Female	15 (44)
Length of stay (mean±SD)	10 (±5.2)

Table 4. Distribution in relation to the system involved

System involved	Length of stay days (mean)	Survival rate (%)	Death rate (%)
Allergic and immunology	58 (19)	100	0
Endocrine	59 (14)	100	0
Gastrohepatology disorder	86 (6)	85	15
Hematology and oncology disorder	273 (10)	81	19
Infection	277 (10)	82	18
Cardiovascular	87 (9)	78	22
Nephrological	154 (14)	82	18
Neurological	713 (13)	87	13
Respiratory	414 (8)	79	21

with the majority of males 54% than 46% females, this is in line with the study of Sahoo et al. In India.⁷ This study shows that respiratory, neurological, and infectious diseases are the most common diseases that cause children to be admitted to the PICU. This is similar to Shah S et al study, which reported that respiratory emergency was the biggest indication for

admission to the PICU.⁸ Other studies have also stated that respiratory disease is the most common cause of patients being treated in intensive care units.²

The mortality rate for this study was 17% with a mean length of stay of 10 days. Another study by El Halal et al showed a higher mortality rate (11.9%) in patients treated for more than seven days.⁹ The

Table 5. Disease in thrombocytopenic and non-thrombocytopenic

Disease	Thrombocytopenic	Non-thrombocytopenic
	N (%)	N (%)
Dengue Infection	20 (35)	0 (0)
Sepsis	13 (22.8)	10 (10.3)
Central Nervous system disorder	11 (19.3)	47 (32.4)
Hematology Disorder	7 (12.2)	13 (8.9)
Others	6 (10.5)	77 (47.6)

Table 6. Disease in increase of CRP

Disease	CRP \geq 10 g/l	CRP < 10 g/l
	n (%)	n (%)
Sepsis	29 (96.7)	1 (3.3)
Pneumonia	9 (75)	3 (25)
Dengue Infection	6 (100)	0 (0)
Non-Infection	3 (75)	1 (25)

ICU mortality rate varies depending on the case, age, length of stay, and patient comorbidities.¹⁰ Other data from India shows a 10.5% mortality rate. Important factors that influence the recovery of patients include human resources, adequate equipment, and continuous medical education from the institution.¹¹

The most common cause of death was pneumonia (32%). This is in line with a study in India by Divecha et al, where pneumonia contributed to 66.89% of PICU hospitalizations and 91% of deaths. From this study it was also stated that one third of patients did not receive complete immunization and were malnourished, so this situation could increase the severity of infection and increase mortality.¹²

Length of stay in PICU is a marker of illness severity, resource utilization, and performance. International studies had described small PICU with long stay patients 1-7.5% of the total PICU population.¹³ In our study, support these findings with 3% long stay patient. From a study in India, the mean duration of stay in PICU was 3.2 ± 4.5 days, which is similar to the records of Haque and Bano¹ in Pakistan, but in contrast, a mean duration of 4.52 ± 2.6 days was reported by Khilnani et al.¹¹ In our study, the median length of stay was longer to 9 days.

Low survival rate in cardiovascular and respiratory was also observed in Volakli et al and Singhal et al with respiratory condition was the most common cause of

death.^{14,15} Cardiovascular disease in our study was congenital heart disease (CHD) consistent with Gundogdu et al. reported that in PICU nearly half of all mortality caused by CHD occurred during infancy.¹⁶

This study shows the incidence of thrombocytopenia was 28.2% which is lower than study by Kaur et al. and Yilmaz et al. where their incidence was 32.4% and 59.7% respectively.^{17,18} While our study was higher than the study by Agarwa et al., i.e. 25%.¹⁹ This difference may be because other studies had smaller total samples and shorter duration of time.

Our study shows increase of CRP above the cut-off point was 90% of 53 patients, which was sepsis as the most common disease. Similar to a study by Fatima et al where 95.6% of sepsis patients had increased CRP.²⁰ Total mortality in our patient was 38.7%, similar to study by Sharma et al had mortality rate 37.6%. Other studies done previously by Horvat et al and Lubis et al was 21.7% and 55.7% respectively.²¹⁻²³

From this study, the respiratory disease was the most common disease for patients admitted to PICU and was the most common cause of death. Based on this data, it is necessary to focus on medical facilities and interventions such as immunization, improving nutrition, education about the dangers of disease and anaemia therapy for strategies to reduce respiratory-related mortality, and children under one year of age with respiratory diseases to receive

the early intervention because the risk of death is higher based on previous reports.

A potential limitation of our study related to the sample size and population we used may not be representative of the whole region and limit our ability to transfer our findings to other regional hospitals and countries because all patients participating in this study were from Ulin Hospital Banjarmasin. However, this study might be used as a reference for future studies.

CONCLUSIONS

This study shows that respiratory, neurological, and infectious diseases are the most common diseases that cause children to be admitted to the PICU. The mortality rate in this study was 17% with a mean length of stay of 10 days. Respiratory disease was the most common disease for patients admitted to PICU and was the most common cause of death. Thrombocyte level and CRP might be used as mortality predictors. Based on these findings, it is necessary to focus on medical facilities and interventions to reduce respiratory-related mortality.

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CONFLICT OF INTEREST

None declared.

ETHICAL CONSIDERATION

Ethical approval has been approved by ethical committee for study of Ulin Hospital Banjarmasin.

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AUTHOR CONTRIBUTION

All authors equally contribute to the study from the conceptual framework, data acquisition, data analysis until interpreting the study results through publication.

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