

## **Relationship between Age and Quality of Life of Pediatric Intensive Care Survivors**

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**Background:** PICU main focuses were on the area of life support with intensive monitoring and special care aiming save the lives of critically ill children, paying attention to physical and psychological sequelae, and trying to maximize the quality of life. Researches on the quality of life of survivors of PICU is still limited, especially in Indonesia.

**Objective:** To assess the relationship between age and quality of life of children with intensive care.

**Methods:** A cross-sectional study of patients aged 2-18 years with a history of being treated at the PICU of the Haji Adam Malik Hospital, Medan, from January 2017- December 2018. Assessment for the quality of life was carried out using the Peds QL<sup>TM</sup> 4.0 questionnaire containing 4 task domains; the physical function domain, emotional function domain, social function domain, and school function domain. Patients were interviewed by Peds QL for parent reporting 1-2 years after discharge from PICU treatment.

**Results:** A total of 45 research subjects were analyzed. There were differences in quality of life based on age groups, the higher the age of the subjects the better the quality of life ( $p < 0.05$ ). There were differences in quality of life on the domain of physical function, social function domain, and domain of school function by age group, which the higher the age of the subject the better the quality of life ( $p < 0.05$ ), while one domain is emotional function, there was no difference on quality of life based on age group ( $p > 0.05$ ). The 2-4 years age group had problems on all four domains, while the higher age group is 5-18 years did not suffer problems in all four task domains.

**Conclusion:** There are differences in quality of life based on age groups, which the higher the age of the subject, the better the quality of life.

**Keywords:** Quality of life, survivors, pediatric intensive care, age

### **Background**

The Pediatric Intensive Care Unit (PICU) is a separate unit within the hospital that designed for the management of children with critical illness due to illness, trauma, shock or complications of diseases such as neurological, cardiovascular, respiratory, and metabolic problems that threaten life and care after major surgical procedures. PICU care focuses on areas of life support or organ support that require intensive monitoring and special care.<sup>1-3</sup>

Pediatric intensive care services have made significant progress in the field of science and technology over the past 3 decades, particularly in the technical monitoring and management of patients with critically ill children.<sup>4</sup> This has contributed to reducing length of stay, days of mechanical ventilation, mortality, and increasing healing rates of children in PICU care. In addition, the special needs of critically ill children and their families can be met.<sup>1,4,5</sup> Intensive care of children not only seeks to save the lives of critically ill children, but also pay attention to the physical and psychological sequelae, and try to maximize their quality of life.<sup>6</sup> Therefore knowing how the quality of life of children after PICU treatment is an important thing that must be considered.<sup>7-10</sup>

In daily practice, pediatricians were often confronted with the question of how the quality of life in children after intensive care. Research conducted by Ambuehl and colleagues reported that of 484 PICU survivors, 77% of all children had a good quality of life, 15% had a moderate quality of life, and 8% had a poor quality of life.<sup>9</sup> Several other studies also reported that PICU survivors had good quality of life.<sup>7,10</sup> In addition there are several factors that affect the quality of life of pediatric intensive care survivors, one of which is the neurological disease that causes patients to be treated at PICU.<sup>10</sup>

Research on the quality of life of survivors of PICU is still limited, especially in Indonesia. Therefore, researchers are interested in assessing how the quality of life of pediatric intensive care survivors at the Haji Adam Malik General Hospital.

The main objective of this study was to determine the relationship of age groups with the quality of life of pediatric intensive care survivors at H. Adam Malik General Hospital Medan.

## **METHODS**

### **Study Design**

A cross sectional study was conducted in November until Desember 2019 at the Haji Adam Malik General Hospital by consecutive sampling. The inclusion criterias were age between 2-18 years old, the patients who have been treated in PICU at Haji Adam Malik General Hospital, and completed the identity in the Medical Record. The exclusion criterias were patients cannot be contacted (phone numbers or addresses do not match the data in the medical record), parents or guardians were unwilling to be interviewed and take part in research. This study was approved by the Health Research Ethics Committee of the Faculty of Medicine, University of Sumatra Utara.

All students who fulfilled the inclusion criterias were enrolled in this study after given consent. We interviewed subject to obtained demographic data. Treatment and indication inpatient in PICU datas was collected from the medical record. Quality of life was measure with Peds QL Sheet. All data is recorded in research status, collected and then processed using computer software. Chi-square test was used to analyze the short stature relationship and learning achievement and p value <0.05 was considered significant.

## **RESULTS**

The study was conducted at the Haji Adam Malik General Hospital. The minimum sample size for this study was 42 children. Of the 45 children found as many as 24 subjects (53.3%) were boy, 14 subjects (31.1%) aged 2-4 years, 26 subjects (57.8%) with well nourished. The average length of stay in PICU were 7.0 (10.59) days, the main diseases with condition relationship with surgical problem were 30 subjects (66,7%). According to the history of medication, 35 subjects (77.8%) got sedation, 34 subjects (75.6%) got the mechanical ventilation with 32 subjects (71.1%) among them had the length of mecanical ventilation for  $\leq 7$  days. The subject who got the inotropic or vasoactive were 10 subjects (22.2%).

Table 1 Demographic characteristics of subjects (n=45)

Characteristics	n = 45
<b>Sex, n(%)</b>	
Boy	24(53.3)
Girl	21(46.7)
<b>Age group, n(%)</b>	
2-4 years old	14(31.1)
5-7 years old	9(20.0)
8-12 years old	10(22.2)
13-18 years old	12(26.7)
<b>Nutritional states, n(%)</b>	
Severe malnutrition	8(17.8)
malnutrition	11(24.4)
Wellnourish	26(57.8)
<b>Length, median day range()</b>	7(2-54)
<b>Basic illness, n(%)</b>	
Neurology	5(11.1)
Metabolic	2(4.4)
Respiration	3(6.7)
Surgical	30(66.7)
Cardiology	2(4.4)
Syock	2(4.4)
Nefrology	1(2.2)
<b>Sedation, n(%)</b>	
Yes	35(77.8)
No	10(22.2)
<b>Mecanical ventilation, n(%)</b>	
Yes	34(75.6)
No	11(24.4)
<b>Length of mecanical ventilation, day, n(%)</b>	
≤7 days	32(88.8)
>7 days	4(11.1)
<b>Inotropic/vasoactive, n(%)</b>	
Yes	10(22.2)
No	35(77.8)

Chi-square test was used to analyze the relationship quality of life and age groups ( $p < 0.05$ ). Table 2, table 3 and table 4 showed the difference quality of life physical domain, social domain, emotional domain, and school domain with age groups of all subjects.

Table 2. Relationship between quality of life physical domain and age groups

Quality of life score	Age Group, n(%)				P
	2-4	5-7	8-12	13-18	
<70	9(64.3)	1(11.1)	0	1(8.3)	0.001
≥70	5(35.7)	8(88.9)	10(100)	11(91.7)	

\*chi-square test

Table 3. Relationship between quality of life social domain and age groups

Quality of life score	Age Group, <i>n</i> (%)				P
	2-4	5-7	8-12	13-18	
<70	4(28.6)	0	2(20.0)	1(8.3)	0.252
≥70	10(71.4)	9(100)	8(80.0)	11(91.7)	

\*chi-square test

Table 4. Relationship between quality of life emotional domain and age groups

Quality of life score	Age group, <i>n</i> (%)				P
	2-4	5-7	8-12	13-18	
<70	9(64.3)	1(11.1)	1(10.0)	2(16.7)	0.006
≥70	5(35.7)	8(88.9)	9(90.0)	10(83.3)	

\*chi-square test

Table 5. Relationship between quality of life school domain and age groups

Quality of life score	Age group, <i>n</i> (%)				P
	2-4	5-7	8-12	13-18	
<70	10(71.4)	3(33.3)	2(20.0)	3(25)	0.033
≥70	4(28.6)	6(66.7)	8(80.0)	9(75)	

\*chi-square test

Table 6. Relationship between quality of life and age groups

Quality of life score	Age group, <i>n</i> (%)				P
	2-4	5-7	8-12	13-18	
<70	9(64.3)	1(11.1)	0	2(16.7)	0.001
≥ 70	5(35.7)	8(88.9)	10(100.0)	10(83.3)	

\*chi-square test

## Discussion

Critical illness is known dependent on one or more forms of technology to maintain vital functions or involvement of multiple persistent vital organ systems.<sup>11</sup> Intensive care of children not only seeks to save the lives of critically ill children, but also pays attention to physical and psychological sequelae, and seeks to maximize their quality of life.<sup>6</sup> The quality of life of children survivor has increased at least 9 months after successfully discharged from intensive care along with the recovery process from the illness suffered.<sup>8</sup>

Nutritional status affects the quality of life of intensive care survivors.<sup>12</sup> Subjects in this study showed as many as 57.8% with well nourished and have a good quality of life. A systematic review by Berghe et al reported an association between adequate nutrition with reduced postoperative complications, recovery time, and reduced length of stay, and good quality of life.<sup>13</sup>

Quality of life in the domain of physical function based on the age group is found that the higher the age of the child, the better the quality of life. Similar results were reported by Knoester et al. The quality of life of the physical function domain of ages 1-6 years was lower than the greater age. This is due to physical recovery after the child discharged from PICU.<sup>14</sup> Physiologically the recovery time process takes time, and the side effects of illness or acute injury will disappear after a longer period of time in most children.<sup>7</sup>

Research conducted by Gemke et al, and Knoester et al, conducted in the Netherlands reported that quality of life of the emotional functioning domain in children with PICU survivors was decreased, which children have a prolonged, irritable, and more sensitive fear that requires attention.<sup>15,16</sup> This is consistent with the results of this study in which the quality of life of the emotional function domain of survivors of PICU has a low value and no differences in the quality of life of the emotional function domains are found by age group. Children have physical function improvement over time, but not in emotional function.<sup>16</sup>

In this study we found different qualities of cognitive and psychosocial functions based on age groups. The older age had a better quality of life compared to a younger age. The younger age of children receiving PICU treatment was associated with lower cognitive function. In addition, a large number of children who had managed to live with a history of shock, although school.<sup>17</sup> Evaluation of cognitive function in patients with pediatric meningitis showed substantial problems that interfere daily life.<sup>18,19</sup> Possible pathophysiological mechanisms that mediated cognitive dysfunction in survivors of sepsis including hypoxemia, sedatives or analgesics, hypotension, delirium, hyperglycemia, sepsis and inflammation.<sup>18</sup>

Broadly speaking, the quality of life of survivors of PICU was better at ages above 4 years compared to younger ages. Therefore, doctors and parents attention about the underlying disease and the quality of life for PICU's Survivors need to be improved for the better quality of life of Indonesian children.

## Conclusion

There was a significant differences on the quality of life of child intensive care survivors by age group where the greater the age of the subject the better the quality of life.

## Reference

1. Latief A, Pudjiadi AH, Kushartono H, Malisie RF.(2006), "Rawat Intensif". In: Pelayanan emergensi, rawat intermediat dan rawat intensif anak. Editor Latief A, Pudjiadi AH, Kushartono H, Malisie RF. Badan Penerbit Ikatan Dokter Anak: Jakarta. Pp. 26-9.
2. Shime N, Kawasaki T, Saito O, Akamine Y, Toda Y, Takeuchi M.(2012), "Incidence and risk factors for mortality in paediatric severe sepsis: results from the national paediatric intensive care registry in Japan." *Intensive Care Med*,12,25-32.

3. Rosenberg DI, Moss MM.(2004), "Guidelines and levels of care for pediatric intensive care units." *Pediatrics*, 114,1114-25.
4. Namachivayam P, Shann F, Shekerdemian L, Taylor A, Sloten IV, Delzoppo C, et al.(2010), "Three decades of pediatric intensive care: Who was admitted, what happened in intensive care, and what happened afterward." *Pediatr Crit Care Med*, 11,549–55
5. Knoester H, Bronner MB, Bos AP.(2008), "Surviving pediatric intensive care: physical outcome after 3 months." *Intensive Care Med*, 34,1076-82.
6. Conlon NP, Breatnach C, O'Hare P, Mannion DW, Lyons BJ.(2009), "Health-related quality of life after prolonged pediatric intensive care unit stay." *Pediatr Crit Care Med*,10,41-4.
7. Polic B, Mestrovic J, Markic J, Mestrovic M, Capkun V, Utrobicic I, et al.(2012), "Long-term quality of life of patients treated in paediatric intensive care unit." *Eur J Pediatr*, 1-6
8. Ambuehl J, Karrer A, Meer A, Riedel T, Schibler A.(2007), "Quality of life of survivors of paediatric Intensive care." *Swiss Med Wkly*,137,312–6.
9. Kyösti E, Ala-Kokko TI, Ohtonen P, Peltoniemi O, Rautiainen P, Kataja J, et al.(2018), "Factors associated with health-related quality of life 6 years after ICU discharge in a Finnish paediatric population: a cohort study." *Intensive Care Med*,44,1378–87
10. Sahoo B, Jain MK, Thakur B, Mishra R, Patnaik S.(2018), "Demographic profile and outcome of mechanically ventilated children in a tertiary care hospital of a developing country.: *J Nepal Paediatr Soc*, 38,14-8.
11. Knoester H, Bronner MB, Bos AP, Grootenhuis MA.(2008), "Quality of life in children three and nine months after discharge from a paediatric intensive care unit: a prospective cohort study." *Health and Quality of Life Outcomes*,6,1-10.
12. Crow SS, Undavalli C, Warner DO, Katusic SK, Kandel P, Murphy SL, et al.(2017), "Epidemiology of pediatric critical illness in a population-based birth cohort in Olmsted County." *Pediatric Critical Care Medicine*,18, e137–45.
13. Chalid M, Wahyuni S, Islam AA.(2014), "Gambaran Umum Program 1000 Hari Awal Kehidupan." *Sagung Seto: Makasar*.Pp: 1-10.
14. Shudy M, de Almeida ML, Ly S, Landon C, Graft S, Jenkins TL, et al. (2006), "Impact of Pediatric Critical Illness and Injury on Families: A Systematic Literature Review." *PEDIATRICS*,118, S203–18.
15. Knoester H, Bronner MB, Bos AP, Grootenhuis MA. (2008), "Quality of life in children three and nine months after discharge from a paediatric intensive care unit: a prospective cohort study." *Health and Quality of Life Outcomes*,6,1-10
16. Gemke RJ, Bonsel GJ, Vught AJ.(1995), "Long term survival and state of health after paediatric intensive care." *Arch Dis Child*, 73, 196-201
17. Herridge MS, Batt J, Hopkins RO.(2008), "The pathophysiology of long-term neuromuscular and cognitive outcomes following critical illness." *Crit Care Clin*, 24,179–99
18. Koomen I, Raat H, Jennekens-Schinkel A, et al. (2005), "Academic and behavioral limitations and health-related quality of life in school-age survivors of bacterial meningitis." *Qual Life Res*,14,1563–72.
19. Sharshar T, Carlier R, Bernard F, et al.(2007), "Brain lesions in septic shock: A magnetic resonance imaging study." *Intensive Care Med*,33,798–806.