

## **Correlation of Characteristics and Nutritional Status on Length Of Stay of ICU Patients in Purwakarta**

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### **ABSTRACTS**

Length of stay shows the level of management efficiency and quality of care provided by the hospital. The length of stay from the economic aspect for the patient will increase the cost of care that they have to pay. Characteristics, nosocomial infections, complications, and wound healing can affect the patients' length of stay. This study aims to analyze the correlation between characteristics and nutritional status with the length of stay of ICU patients in Purwakarta. This study is a quantitative analytical study using secondary data, namely the patient's medical record. The accidental sampling technique selected a total of 80 patient data in this study. The variables studied were gender, age, occupation, type of diagnosis, nutritional status, and length of stay. Data were analyzed using chi-square. The results of the analysis using the Chi-square test showed that there were three variables related to the length of stay of ICU patients, namely age ( $p = 0.040$ ), type of disease ( $p = 0.005$ ), and nutritional status ( $p = 0.047$ ). Gender ( $p=0.96$ ) and occupation ( $p=0.234$ ) were not related to the length of stay of ICU patients. Age, type of diagnosis, and nutritional status related to the length of stay of ICU patients. Hospitals need to provide exceptional services to elderly and malnourished patients to speed up the healing process.

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## 1. Introduction

The quality of health services is the demand of all relevant parties, for the hospital itself, health insurance, and the wider community. Some public service managers still misinterpret the role of the community in need of service. One of the parameters used to assess the efficiency of a hospital is the length of stay.<sup>1</sup> The length of stay, in addition to showing the efficiency level of hospital management, also shows the effectiveness of the hospital from the quality of care carried out by professionals in hospitals.<sup>2</sup>

Length of days of stay is one element or aspect of service care in hospitals that can be assessed and measured. The prolonged hospitalization length can be caused by the patient's medical condition or the presence of a nosocomial infection that prolongs the length of the day of stay that can reach 5-20 days.<sup>3</sup> Richard Johnson and Jennifer Simpson (2009) stated that the length of hospitalization could increase due to nosocomial infection to 13.3 days, two times longer than usual. Medical treatment, such as administrative delays in hospitals, poor planning in providing services to patients (patient scheduling), or policies in the medical field (medical policy).<sup>4</sup>

The standard length of hospital stay or average length of stay (AvLOS) ranges from 6-9 days. The higher AvLOS is defined as the low level of health services in inpatient units or the inefficient delivery of health services in hospitals. On the other hand, decreasing AvLOS indicates an increase in the quality and efficiency of the services provided, increasing patient satisfaction with the need for health services.<sup>5</sup> Extended hospital days can be caused by medical conditions or nosocomial infections.<sup>3</sup> The infection status in the wound can increase the length of the patient's stay in the hospital.<sup>6</sup> The increase in LOS from the medical aspect is considered poor quality medical performance because patients have to be treated longer. In contrast, the economic aspect for patients will increase the cost of care to have to pay.<sup>7</sup>

The length of days hospitalized for surgical patients is highly dependent on wound healing.<sup>8</sup> Factors that influence the healing of wounds include age, gender, nutritional status, pre and postoperative medical conditions such as anemia, diabetes, jaundice, renal failure, anesthesia score, intraoperative fatigue, rupture of suture material, and elective conditions emergency surgery, Injury or increased intra-abdominal pressure.<sup>9</sup> These complications result in morbidity, mortality, and socioeconomic conditions.<sup>10</sup>

The presence of malnutrition when the patient entered the hospital resulted in these patients having a longer LOS compared to patients with good nutritional status and had a higher risk of experiencing malnutrition during treatment.<sup>11</sup> ICU patients with BMI < 13 kg/m<sup>2</sup> in men and < 11 kg/m<sup>2</sup> in women were also reported to have a higher mortality rate than patients with a larger BMI.<sup>12</sup> Malnutrition has been associated with poor outcomes experienced by patients in the intensive care unit (ICU), including increased morbidity, mortality, and length of stay.<sup>13</sup>

The Intensive Care Unit (ICU) is a part of the hospital, with exceptional staff and equipment intended to treat and closely monitor patients suffering from life-threatening or potentially life-threatening injuries, illnesses, or complications. One of the indications for entering patients into the ICU is postoperative patients.<sup>14</sup> The length of stay for ICU patients with heart surgery at Dr. Kariadi Hospital is influenced by age, diagnosis of other diseases, and postoperative complications.<sup>15</sup> This study aims to analyze the correlation between individual characteristics and nutritional status with the length of stay ICU patients in Purwakarta.

## 2. Materials and Methods

This research is quantitative analytic using secondary data. This study explains the relationship between variables through hypothesis testing. The approach to data collection time uses a cross-sectional design, meaning that all variables are collected at one time. The population in this study was the medical records of all patients admitted to the ICU in one month. The average number of patients admitted to the ICU was calculated from the number of ICU patients in the last two months as many as 100 people. The research sample was calculated using the Slovin formula so that a sample size of 80 patients was obtained. The sampling technique used was accidental sampling. The inclusion criteria set in this study were medical records of ICU patients with age more than 20 years (adult age). In contrast, the exclusion criteria set were incomplete, damaged, defective, or missing medical record data. The variables studied were age, gender, occupation, type of diagnosis, nutritional status, and length of stay. The analysis was carried out using chi-square with a degree of confidence = 0.05, meaning the confidence level was 95%. The Chi-square test is a statistical technique intended to test the relationship between two categorical variables.

## 3. Results and Discussion

This study was conducted for two months between May-June 2019 at X Hospital in Purwakarta. A total of 80 patient medical records were studied in this study with the following description:

**Table 1.** Correlation between individual characteristics and nutritional status with length of stay

Variables	LOS≤9 days		LOS>9 days		total		p-value
	n	%	n	%	N	(%)	
<b>Age</b>							
- > 55 y.o (geriatric)	13	35,1	25	58,1	38	47,5	0,040
- ≤ 55 y.o (adult)	24	64,9	18	41,9	42	52,5	
<b>Gender</b>							
- male	20	54,1	23	53,5	43	53,8	0,960
- female	17	45,9	20	46,5	37	46,2	
<b>Occupation</b>							
- labor	0	0	1	2,4	1	1,3	0,234
- farmer	8	21,6	4	9,3	12	15	
- housewife	10	27,1	12	27,9	22	27,5	
- students	5	13,5	4	9,3	9	11,3	
- retirement	0	0	5	11,6	5	6,3	
- entrepreneur	3	8,1	7	16,3	10	12,5	
- private employee	4	10,8	5	11,6	9	11,3	
- public employee	7	18,9	5	11,6	12	15	
<b>Types of diagnose</b>							
- cardiovascular	1	2,8	2	4,8	3	3,8	0,005
- respiratory	6	16,2	2	4,8	8	10	
- neurological disorder	3	8,1	21	48,9	24	30	
- gastrointestinal	9	24,3	5	11,6	14	17,5	
- Endocrine	4	10,8	5	11,6	9	11,2	
- Laparostomy	2	5,4	1	2,4	3	3,8	
- Others	12	32,4	7	16,3	19	23,7	

Variables	LOS $\leq$ 9 days		LOS $>$ 9 days		total		p-value
	n	%	n	%	N	(%)	
Nutritional status							
- malnutrition	22	59,5	16	37,2	38	47,5	0,047
- Normal	15	40,5	27	62,8	42	52,5	

The results of the univariate analysis showed that most of the patients aged less than 55 years (52.5%), male (53.8%), housewives (27.5%), had a diagnosis of neurological disorders (30%), had normal nutritional status (52.5%), and hospitalized for more than 9 days (53.8%). This study showed that there were four variables related to the length of stay of ICU patients, namely age ( $p = 0.040$ ), type of disease ( $p = 0.005$ ), and nutritional status ( $p = 0.047$ ) because it has a  $p$ -value  $> \alpha$ ,  $= 0.05$ . Variable gender ( $p=0.96$ ) and occupation ( $p=0.234$ ) were not related to the length of stay of ICU patients. Most of the patients studied in this study were adults, namely 52.5%. The univariate test results also showed that more elderly patients had a length of stay of more than nine days than adult patients, 58.1%. The bivariate analysis results showed a significant relationship between age and length of stay, which was indicated by a  $p$ -value of 0.040 ( $p < \alpha$ ,  $= 0.05$ ). Age has an Odds Ratio (OR) value of 4.8, meaning that elderly ICU patients are 4.8 times at risk of having a longer stay than adult patients.

The results of this study are in line with research conducted by Sasmita (2017) at a hospital in Surakarta which stated that personal characteristics, including age, were related to the length of stay of surgical patients.<sup>16</sup> Afif's research (2008) also shows that patients with more than 45 years of advanced age will have a longer risk of hospitalization.<sup>17</sup> The length of stay is longer because older adults experience a decrease in the work system of vital organs and the immune system, which results in immune system dysfunction, destroying fungi and bacteria that enter the body.<sup>18</sup>

Elderly patients have manifestations of infection or sepsis, mental disorders, refusal to eat, weakness, falls, or urinary incontinence, resulting in decreased function and increased length of stay. Elderly patients are prone to sepsis due to high-risk factors such as comorbidities, instrumentation, repeated hospitalizations, malnutrition, old conditions, and geriatric giants.<sup>19</sup>

Most of the patients in the ICU were male (53.5%), both on LOS before nine days and after nine days. These results align with the study of Amiman, et al (2016) which stated that the distribution of LOS by gender obtained the number of male patients more than female patients.<sup>20</sup> However, the highest LOS was in female patients with hemorrhagic stroke.

Gender is not related to the length of stay. It is proven to have a value of  $p=0.960$  ( $p > \alpha$ ,  $= 0.05$ ), so the hypothesis is not fulfilled. These results align with the research of Saxena et al. (2016) in India, which showed that gender did not affect the length of stay of acute stroke patients. Saxena also stated that all demographic factors did not affect LOS in acute stroke patients.<sup>21</sup> Arboix, et.al (2012) expressed different results who stated that gender was one of the predictors of the length of stay of stroke.<sup>22</sup>

The cohort study conducted by Arboix (2001) showed that women and men differed in risk factor profiles, presentation of acute stroke, and stroke etiology.<sup>23</sup> This difference only occurs in the aetiological process, but clinical outcomes are not significantly different between women and men.<sup>24</sup> Clinical manifestations that did not differ between men and women resulted in no difference in length of stay between the two groups.

Diseases with neurological disorders are the most common diagnoses suffered by ICU patients, 30%. The neurological disease also had the highest percentage of LOS  $> 9$  days

(48.8%). The most common diseases are hemorrhagic stroke and sepsis. This result is different from Hardisman (2008) study, which stated that the group diagnosed with decreased/impaired consciousness and cardiovascular-circulation disorders required a more extended treatment, with a length of stay > seven days, namely 30.4% 25.6%, respectively.<sup>25</sup>

The bivariate analysis results showed that the diagnosis of the disease was related to the length of stay with a p-value of 0.005 ( $p < \alpha$ , =0.05). The results of this study are in line with previous research conducted by stating that the length of hospitalization is related to the type of disease.

Assessment of Nutritional Status using BMI indicators is divided into four categories: chronic energy deficiency, normal, overweight, and obesity. However, this study was only classified into normal and malnutrition. The results of the univariate analysis showed that most of the patients had normal nutritional status (52.5%). The bivariate analysis results showed that nutritional status was related to the length of stay, as evidenced by the p-value of 0.047 ( $p < \alpha$ , =0.05). A good body mass index and high self-efficacy are associated with the recovery process in the elderly. Higher BMI is also associated with reduced mortality in critically ill adults, including the elderly.<sup>26,27</sup>

Weight loss of 10% or 10 lbs over 12 months indicates protein-calorie malnutrition, resulting from inadequate caloric intake. Patients with body weight < 85% of ideal body weight or BMI < 18.5 kg/m are included in the category of moderate malnutrition, while severe malnutrition if their weight is < 75% ideal body weight or BMI < 16 kg/m.<sup>28</sup> ICU patients with BMI < 13 kg/m in men and < 11 kg/m in women were also reported to have a higher mortality rate than patients with a greater BMI.<sup>12</sup>

Malnutrition can occur before being treated for illness or inadequate nutritional intake, but malnutrition can also occur during hospitalization. Malnutrition occurs in 40–60% of hospitalized patients with acute illness, initially presenting without nutritional problems and then gradually declines in nutritional status within three weeks.<sup>29</sup>

The results of this study are also in line with previous studies, which showed that patients with poor nutritional status during hospitalization would affect the length of stay 6.3 times longer. Patients also have a 3.3 times higher risk of spending more treatment costs than patients with protein intake and good nutrition.<sup>30</sup>

#### 4. Conclusions

Most of the patients in this study were adults, while the length of stay was more than nine days. there were four variables related to the length of stay of ICU patients, namely age, type of disease, and nutritional status. Variable gender and occupation were not related to the length of stay of ICU patients. Age has an Odds Ratio (OR) value of 4.8, meaning that elderly ICU patients are 4.8 times at risk of having a longer stay than adult patients. Recommendations for hospitals are optimizing services so that the length of stay, especially for the elderly, can be shorter. Further research is needed on the variables/factors that support the improvement of the length of stay, such as nurse competence, feeding, etc. so that the quality of service can be improved.

#### 5. References

1. Barbara J, Billie F., Brahm Pendit (2006). Buku Ajar Perawatan Perioperatif Vol. 2. Praktik. Penerbit Buku Kedokteran EGC. Cetakan I. Jakarta
2. Iezzoni, Lisa I, Michael DP. Patient's Perspective: Hard Lessons from a Long Hospital Stay. American Journal of Nursing, volume 112, Desember 2012

3. Depkes. R.I. (2005). Indikator Mutu pelayanan. Ditjen Yankes, Jakarta
4. Richard Johnson, Jennifer Simpson (2009). Reducing Length of Stay for Colorectal Surgery Patients using Enhanced Recovery Techniques. Cancer Inpatient Case Study. NHS Improvement.
5. Kemenkes, (2010). Permenkes 1778/MENKES/SK/XII/ 2010. Pedoman Penyelenggaraan Pelayanan ICU di Rumah Sakit.
6. Solowiej, Mason, & Upton. Review of the relationship between stress and wound healing: part 1. Journal of wound care. 2009; 18(9)
7. Imbalo S. (2007). Jaminan Mutu Layanan Kesehatan: Dasar-Dasar Pengertian dan Penerapan, EGC, Jakarta
8. Gouin & Glaser. The Impact of psychological stress on wound healing: methods and mechanism. Immuno Allergy Clin North Am. 2011; 31(1): 81-93
9. Guo & Di Pietro. Factors affecting wound healing. Journal Dent Res. 2010; 89(3): 219-229
10. Velnar, Bailey & Smrkolj. The wound healing process ;an overview of the celluler and moleculer mechanism. Journal of international medical research. 2009; 37(5): 1528-1542
11. Marchetti J, Reis AM Dos, Santos AF Dos, Franzosi OS, Luft VC, Steemburgo T. High nutritional risk is associated with unfavorable outcomes in patients admitted to an intensive care unit. Rev Bras Ter intensiva. 2019;31(3):326–32
12. David F, Bruce R, Irwin and Rippe's Intensive Care Medicine 7ed, (2011). Parenteral and Enteral Nutrition in the Intensive Care Unit, Chapter 191. Lippincott William & Wilkins
13. Imran K, Pratik Doshi, Bruno DiGlovine. Early Enteral Nutrition and Outcomes of Critically Ill Patients Treated with Vasopressors and Mechanical Ventilation. Am J Crit Care. 2010; 19(6): 261-268
14. Farid, S. Rerata waktu penggunaan ventilator pada pasien surgical ICU RSUP Dr. Kariadi pada bulan Januari 2010-Januari 2011 [dissertation]. Semarang (Indonesia): Universitas Diponegoro, 2011
15. Dewanti IP. Lama Rawat Intensive Care Unit (ICU) Pasien Pasca Operasi Jantung di RSUP Dr. Kariadi Semarang. Universitas Diponegoro Fakultas Kedokteran. Naskah tidak dipublikasikan, 2014
16. Sasmita ED. Hubungan Karakteristik Personal Pasien Dengan Lama Rawat Pasien Moderate Care di Rumah Sakit Ortopedi Prof. Dr. R. Soeharso Surakarta. Universitas Muhammadiyah. Skripsi. Naskah tidak diterbitkan, 2017
17. Afif, Ahmad. Hubungan Faktor Komorbid, Usia dan Status Gizi dengan Lama Rawat Inap pada Pasien Hernia Inguinalis Lateralis Reponibilis yang Dioperasi Herniorepair Tanpa Mesh di RS PKU Muhammadiyah Surakarta Periode 2005-2007. Skripsi, 2008
18. Schirmer B., Sabiston Jr. Petrus A (2005). Persiapan Praoperasi Pasein Bedah Dalam Buku Ajar Bedah. Penerbit Buku Kedokteran EGC. Jakarta
19. Nasa P, Juneja D, Singh O. (2012) Severe sepsis and septic shock in the elderly: an overview. World J Crit Care Med.;1(1):23-30
20. Amiman RC, Tumboimbela MJ, Kembuan MA. Gambaran length of stay pada pasien stroke rawat inap di RSUP Prof. Dr. RD Kandou Manado periode Juli 2015-Juni 2016. e-CliniC. 2016;4(2).

21. Saxena A, Prasad RN, Verma K, Saxena S. (2016). Factors Predicting Length of Hospital Stay in Acute Stroke Patients Admitted in a Rural Tertiary Care Hospital. *J Gerontol Geriatr Res*. S5: 003
22. Arboix A, Massons J, Eroles LG, Targa C, Oliveres M, Comes E. Clinical predictors of prolonged hospital stay after acute stroke: relevance of medical complications. *Clin Med*. 2012; 3:502-7
23. Arboix, M. Oliveres, L. García-Eroles, C. Maragall, J. Massons and C. Targa (2001), Acute Cerebrovascular Disease in Women, *European Neurology*, 45(4):199-205
24. A. Förster, A. Gass, R. Kern, M. E. Wolf, C. Ottomeyer, K. Zohsel, M. Hennerici and K. Szabo. (2009). Gender Differences in Acute Ischemic Stroke. Etiology, Stroke Patterns and Response to Thrombolysis. *Stroke*. 40(7):2428-2432
25. Hardisman. (2008). Lama Rawatan Dan Mortalitas Pasien Intensive Care Unit (ICU) RS Dr. Djamil Padang Ditinjau dari beberapa Aspek. *Majalah Kedokteran Andalas*, 32(2), 142–150
26. Pickkers P, de Keizer N, Dusseljee J, Weerheijm D, van der Hoeven JG, Peek N. (2013). Body mass index is associated with hospital mortality in critically ill patients: an observational cohort study. *Crit Care Med* 2013; 41:1878–1883
27. Oreopoulos A, Kalantar-Zadeh K, Sharma AM, Fonarow GC. The obesity paradox in the elderly: potential mechanisms and clinical implications. *Clin Geriatr Med*. 2009;25:643–659, viii
28. Dominic J, Irwin and Rippe's Intensive Care Medicine 7ed, (2011). Nutritional Therapy in the Critically Ill Patient, Chapter 190. Lippincott William & Wilkins,
29. Braunchweig, C., Gomez, S., & Sheeam, P. Impact of declines in nutritional status on outcomes in adult patients hospitalized for more than 7 days. *Journal of the American Dietation Association*. 2000; 100:1316 – 1324
30. Nurmala, Susetyowati, Budiningsari D Perubahan asupan zat gizi tidak berpengaruh terhadap lama rawat inap pada pasien dewasa di RSUP Dr. Sardjito Yogyakarta. 14 Nurmala, Susetyowati, R. Dwi Budiningsari. *Jurnal Gizi dan Dietetik Indonesia*. 2014; 2(1):14-22