

**ORIGINAL ARTICLE**

**The Relationship between Changes in Nutrition Status and Length of Hospitalization in Patients in Department of Internal Medicine at University of Sumatera Utara Hospital**

**Nenni Dwi Aprianti Lubis<sup>1</sup>, Chacha Theresia Sianturi<sup>2</sup>, Ridwan Balatif<sup>2</sup>**

<sup>1</sup>Department of Nutrition, Faculty of Medicine USU, Jl. Dr. Mansur No. 5 Medan, Indonesia

<sup>2</sup>Faculty of Medicine USU, Jl. Dr. Mansur No.5 Medan, Indonesia

Correspondence email: [nenni@usu.ac.id](mailto:nenni@usu.ac.id)

**Abstract:** The nutritional status of patients is one factor that influences the length of stay. This study is an analytic study with a cross-sectional design aiming to observe nutritional status, length of treatment, and the relationship between the two variables. The population in this study were patients aged 19-64 years who were treated in the Internal Medicine KSM at USU Hospital in the period August to October 2019. 52 patients were the study samples, with consecutive sampling as the sample selection technique used. We collected research data as nutritional status and length of stay through anthropometric measurements and structured interviews. We distinguish nutritional status based on Body Mass Index (BMI) and Subjective Global Assessment (SGA). The results showed 34 patients (65.4%) based on BMI values decreased nutritional status from  $21.47 \pm 3.79$  to  $21.18 \pm 3.83$  Kg /m<sup>2</sup>. Based on SGA, 32 patients (61.5%) experienced a decrease in score. The mean treatment period was  $5.02 \pm 1.36$  days. From the chi-square test results, it is known that changes in nutritional status based on BMI have a significant relationship to the length of stay with a p-value <0.05.

**Keywords:** BMI, the length of stay, nutritional status, SGA

## INTRODUCTION

Malnutrition is a health problem caused by nutritional deficiencies due to unfulfilled body needs through food intake or the presence of a disease.<sup>1</sup> Malnutrition in patients is associated with various events such as an increased risk of infection, complications, cost of hospitalization, length of stay, and mortality and morbidity.<sup>2,3</sup>

Based on the results of a study conducted by Ordoñez et al in 2013, we found that patients who were hospitalized with malnutrition and did not get sufficient nutritional intake would significantly prolong the length of stay.<sup>4</sup> These results are also supported by a study conducted by Allard et al which concluded that patients with malnutrition when admitted to hospital and less food intake are at risk of experiencing longer hospitalization.<sup>5</sup> The results of studies in Australia and South Korea indicate that the prevalence of malnutrition in hospitalized patients ranges from 20-50%.<sup>6</sup>

The body's metabolism continues in malnutrition, it's just that the source of the materials used comes from body reserves such as fat and protein. If this condition of malnutrition is prolonged, it causes a decrease in protein in the body which results in a decrease in the formation of enzymes, albumin, and immunoglobulin. A decrease in the body's immune system can cause patients in the hospital to experience nosocomial infections.<sup>5</sup> Also, the response to therapy will also be longer, which results in a long treatment period.<sup>7</sup> Malnutrition conditions can be overcome by providing early and adequate nutrition. Provision of proper nutrition can reduce the average length of stay by 3.2 days.<sup>8</sup> This study aims to determine the nutritional status, length of stay, and the relationship between the two

inpatients at the Department of Internal Medicine at the Universitas Sumatera Utara Hospital (USU Hospital).

## METHODS

This type of research is an observational analytic with a cross-sectional design. The population in this study were all inpatients aged 19-64 years at KSM Internal Medicine at USU Hospital from August to October 2019. A total of 52 patients were selected by consecutive sampling, namely sampling which was carried out by selecting samples that met the research criteria. both inclusion and exclusion within a certain period so that the number of samples is met. The inclusion criteria are that the patient is admitted to the hospital in a conscious state and can communicate well, and the maximum length of stay is 14 days. Patients with ascites, hepatomegaly, and edema, patients with end-stage disease, patients who experienced worsening conditions during the treatment period, patients who experienced loss to follow-up, and patients who were unwilling to be the study sample were included in the exclusion criteria.

The research variables were the patient's nutritional status based on body mass index (BMI) and nutritional screening using a subjective global assessment (SGA) and length of stay. BMI is obtained through anthropometric measurements of the patient's weight and height in the first 24 hours at the start of treatment and 24 hours before the patient is allowed to go home by the doctor in charge of treating the patient. Likewise, nutritional screening using SGA with a structured interview technique.

From the weight and height data, we obtained the initial and final BMI values from the sample. The change in BMI is obtained by comparing the final value with

the initial value. It is said to decrease, if the final BMI value is lower than the initial BMI value, and remains if the final BMI value is the same as the initial BMI. The SGA score is assessed by calculating the overall category score. Furthermore, the change in the SGA score is calculated by comparing the initial score with the score at the end of the treatment period. It was said that the change in the SGA score decreased if the initial SGA score changed from A to B or B to C, still if from A to A or B to B. The length of stay was categorized into "long" and "short". The determination of this category is based on the median value obtained, if the length of stay is smaller than the median, the length of stay is said to be short and if the length of stay is greater or equal to the median value it is categorized as long. Furthermore, the relationship between the two variables was analyzed using the Chi-squared test with the help of a computer and said it was related if the p-value <0.05.

## RESULTS

During the period from August to October 2019, 130 patients were treated at the Department of Internal Medicine at USU Hospital, but only 52 patients met the criteria as the study sample. Twenty-four patients were over 64 years old, nine patients had end-stage conditions, we transferred 16 patients to another department, 21 patients suffered from edema and ascites and 8 others refused to take part in the study. The gender of the patients had a balanced proportion between men and women, namely 26 people (50%) each with a mean length of stay of 5 days. Based on the type of disease according to the body's organ system, 18 patients treated suffered from gastrointestinal disorders (34.6%) and followed by pulmonary disease and tropical infectious diseases, each with 9 patients (17.3%). The following are the characteristics of the research sample.

**Table 1. Samples Characteristics.**

Characteristics	Total N (%) or Mean (SD)
<b>Gender</b>	
Male	26 (50%)
Female	26 (50%)
<b>Age</b>	40,33±13,159
<b>Weight (in kilograms)</b>	
Early of stay	58,41±14,204
End of stay	57,63±14,18
<b>Height (in centimeters)</b>	164,15±7,99
<b>Disease category</b>	
Gastrointestinal system, hepatobiliary, and pancreas	18 (34,6%)
Respiratory system	9 (17,3%)
Tropical infection	9 (17,3%)
Renal system	7 (13,5%)
The endocrine and metabolic system	6 (11,5%)
Cardiovascular system	2 (3,8%)
Hematology system	1 (1,9%)
<b>Length of stay</b>	5,02±1,36

From Table 2 it is known that there was a decrease in nutritional status based on BMI during the treatment period, namely  $21.47 \pm 3.79$  to  $21.18 \pm 3.83$  Kg / m<sup>2</sup>. A total of 34 patients experienced a decrease in BMI (65.4%), while 18 other patients had no change in BMI (34.6%) with a mean weight loss of 0.778 kg. Based on the SGA score,

41 patients were in good nutritional status (78.8%) at the start of treatment, 11 other patients were moderately malnourished (21.2%) and none was malnourished. At the end of the hospitalization period, only 10 patients had good nutritional status (19.2%) and the rest were moderately malnourished (80.8%).

**Tabel 2. Samples Nutritional Status**

Characteristics	Total N (%) or Mean (SD)
<b>IMT in Kg/m<sup>2</sup></b>	
Early of stay	21,47±3,79
End of stay	21,18±3,83
<b>Weight differences (in Kg)</b>	0,778±0,674
<b>SGA in the early of stay</b>	
A, Good nutrition	41 (78,8)
B, Moderate malnutrition	11 (21,2)
<b>SGA at the end of stay</b>	
A, Good nutrition	10 (19,2)
B, Moderate malnutrition	42 (80,8)

Based on the length of stay, 23 patients (44.2%) were classified as short-term patients and 29 patients were classified as long-term patients (55.8%). The results of the Chi-square statistical test showed that

changes in BMI were associated with length of stay (p-value = 0.022), on the other hand, changes in SGA scores had no relationship with the length of stay (p value > 0.05) (Table 3).

**Table 3. Nutritional status of the sample**

Variable	Length of stay		p-value
	Short Total N (%)	Long Total N (%)	
<b>IMT changes</b>			
Constant	11 (32,3)	23 (67,7)	0,022
Decreased	12 (66,7)	6 (33,3)	
<b>SGA changes</b>			
Constant	11 (34,4)	21 (65,6)	0,090
Decreased	12 (60,0)	8 (40,0)	

## DISCUSSION

In this study, it is known that there is a reduction in body weight and BMI in patients before and after receiving treatment in the hospital. Feeding factors play an important role in maintaining the patient's

nutritional status. The results of a study conducted by Aquino and Philippi (2011) explain that inadequate food intake is associated with malnutrition (p<0,05).<sup>9</sup> Poor nutritional status and dietary intake were associated with the incidence of

infection, delayed wound healing, cardiac complications, and increased length of hospital stay. Reducing food intake can also increase the risk of death.<sup>10</sup> It was further stated that reducing the number of days of hospitalization could reduce the risk of infection and drug side effects, improve the quality of treatment and increase hospital profits through more efficient bed management. Therefore, the length of the hospital stay is an important indicator of the efficiency of hospital management.

Research conducted by Allard et al on patients in 18 hospitals in Canada concluded that the decline in nutritional status in hospital associated with length of stay was also influenced by other factors such as demographics, accommodation, and disease severity.<sup>11</sup> Malnutrition is common in hospitalized patients which results in the long length of stay and increased mortality. Malnutrition rates tend to be higher in patients over 70 years of age or admitted to hospital for medical services.<sup>6</sup> Malnourished patients have a longer length of stay, recurrence of fewer than 30 days, and incur greater health care costs when compared to well-nourished patients.<sup>12</sup>

Patients who are hospitalized and do not receive adequate nutritional therapy are at risk of experiencing malnutrition during their stay in the hospital. Early screening of patients for the prevention of malnutrition requires not only nutritional therapy management but also adequate coding for the improvement of the hospital financial system.<sup>13</sup> The increased risk of malnutrition during the stay requires nutritional assessment and intervention from the start of the treatment period.<sup>14</sup> Therefore, nutritional screening for each patient at the start of hospitalization is needed to determine appropriate nutritional therapy and

according to patient needs so that the risk of complications from malnutrition itself can be prevented.

## CONCLUSION

Changes in nutritional status based on BMI associated with length of days of stay. It is highly recommended that nutritional screening should be implemented effectively to reduce the incidence of malnutrition in the hospital.

## REFERENCES

1. Álvarez-Hernández J, Planas Vila M, León-Sanz M, et al. Prevalence and costs of malnutrition in hospitalized patients; the PREDyCES® study. *Nutr Hosp.* 2012. doi:10.3305/nh.2012.27.4.5986
2. Ruiz AJ, Buitrago G, Rodríguez N, et al. Clinical and economic outcomes associated with malnutrition in hospitalized patients. *Clin Nutr.* 2019. doi:10.1016/j.clnu.2018.05.016
3. Barker LA, Gout BS, Crowe TC. Hospital malnutrition: Prevalence, identification, and impact on patients and the healthcare system. *Int J Environ Res Public Health.* 2011. doi:10.3390/ijerph8020514
4. Ordoñez AM, Madalozzo Schieferdecker ME, Cestonaro T, Cardoso Neto J, Ligoeki Campos AC. Nutritional status influences the length of stay and clinical outcomes in patients hospitalized in internal medicine wards. *Nutr Hosp.* 2013 Jul-Aug;28(4):1313-20. doi: 10.3305/nh.2013.28.4.6609
5. Allard JP, Keller H, Jeejeebhoy KN, Laporte M, Duerksen DR, Gramlich L, Payette H, Bernier P, Vesnaver E, Davidson B, Teterina A, Lou W.

- Malnutrition at Hospital Admission-Contributors and Effect on Length of Stay: A Prospective Cohort Study From the Canadian Malnutrition Task Force. *JPEN J Parenter Enteral Nutr.* 2016 May;40(4):487-97. doi: 10.1177/0148607114567902
6. Kang MC, Kim JH, Ryu SW, et al. Prevalence of malnutrition in hospitalized patients: A multicenter cross-sectional study. *J Korean Med Sci.* 2018. doi:10.3346/jkms.2018.33.e10
  7. Andreoli A, De Lorenzo A, Cadeddu F, Iacopino L, Grande M. New trends in nutritional status assessment of cancer patients. *Eur Rev Med Pharmacol Sci.* 2011.
  8. Somanchi M, Xuguang Tao, Mullin GE. The facilitated early enteral and dietary management effectiveness trial in hospitalized patients with malnutrition. *J Parenter Enter Nutr.* 2011. doi:10.1177/0148607110392234
  9. Aquino R de C de, Philippi ST. Identification of malnutrition risk factors in hospitalized patients. *Rev Assoc Med Bras.* 2011. doi:10.1590/S0104-42302011000600009
  10. Baek H, Cho M, Kim S, Hwang H, Song M, Yoo S. Analysis of length of hospital stay using electronic health records: A statistical and data mining approach. *PLoS One.* 2018. doi:10.1371/journal.pone.0195901
  11. Allard JP, Keller H, Jeejeebhoy KN, et al. Decline in nutritional status is associated with prolonged length of stay in hospitalized patients admitted for 7 days or more: A prospective cohort study. *Clin Nutr.* 2016. doi:10.1016/j.clnu.2015.01.009
  12. A. R, J.D. M, G. G, et al. Assessing the burden of disease-associated malnutrition among hospitalized malnourished Colombian patients with heart and lung disease. *Value Heal.* 2018.
  13. Konturek PC, Herrmann HJ, Schink K, Neurath MF, Zopf Y. Malnutrition in hospitals: It was, is now, and must not remain a problem! *Med Sci Monit.* 2015. doi:10.12659/MSM.894238
  14. Sun H, Zhang L, Zhang P, et al. Prevalence of Malnutrition in Hospitalized Patients: a Multicenter Cross-sectional Study. *J Korean Med Sci.* 2017. doi:10.1186/s12937-015-0113-1