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## ASSOCIATION BETWEEN THE TYPE OF HOSPITAL WARD AND LENGTH OF STAY (LOS) OF INPATIENTS WITH HEART FAILURE

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### ABSTRACT

**Background:** Hospitals in Indonesia implemented several types of wards, from class III, class II, class I, and VIP. An indicator for assessing efficiency and quality of care is length of stay (LOS). Heart failure has become a worldwide issue with a high burden of medical costs. **Objective:** This study aimed to calculate the average LOS of heart failure patients and to identify their associations with the type of hospital ward. **Methods:** This cross-sectional study extracted data from the hospital information system to gather information on heart failure patients from 2021 to 2024 at PKU Muhammadiyah Yogyakarta Hospital, using purposive sampling. The data was analyzed using the Mann-Whitney U test. **Results:** The average LOS of all heart failure patients was 4,9 days ( $\pm 2,9$ ) with a median of 4,0 days ( $\pm 3,0$ ). Based on the type of wards, average and median LOS in class III were 5 days and 4 days; in class II were 4,2 days and 4 days; in class I were 5,9 days and 4,5 days; and VIP was 3,6 days and 3 days. There were no differences in LOS between class III and non-class III in heart failure patients with a p-value of 0,171. **Conclusion:** The average LOS of heart failure patients was 4,9 days with no differences between them and the type of ward.

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### BACKGROUND

The length of time an inpatient stays in the hospital is known as the hospital length of stay (LOS). Hospitals have long utilized LOS as an indicator to enhance effective patient care and efficiency of lower healthcare expenses, according to health resources and patient medical needs. Of course, there is a great deal of variation. This variance may result from several things, including the patient's traits, their social environment, or their treatment<sup>1-3</sup>. Several variables, such as the patient's characteristics, diagnosis, and the seriousness of the disease, affect LOS<sup>4,5</sup>.

Heart failure has emerged as the most common reason for hospitalization, with a high rate of readmission and mortality. The fact that only 13.30% of people had health insurance in 2013 led to an unhealthy lifestyle and made little effort to stay healthy. There were a variety of days in LOS of heart

failure patients. The median LOS in Indonesia in 2006 was 7.1 days<sup>6</sup>. In the previous study, the average LOS in dr. Kariadi Hospital (RSDK) was  $8.8 \pm 6.7$  days<sup>7</sup>. With 30 patients gathered in RSUP DR. M DJAMIL, the average LOS was 6.23 days<sup>8</sup>. Extended hospital stays are linked to higher rates of readmission of all kinds, as well as mortality<sup>9</sup>.

The length of stay and the type of hospital ward are factors that influence the total cost of treatment<sup>10,11</sup>. The primary determinant of hospital charges for inpatient heart failure is the LOS<sup>12</sup>. The overall cost of HF care may be decreased by lowering LOS and implementing other measures to reorganize hospital-based HF care.

National health coverage schemes, such as Indonesia's Jaminan Kesehatan Nasional (JKN), pool financial resources and provide a unified framework for healthcare financing. The payment scheme implemented by JKN in the hospital is a prospective



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payment pattern. Payment Pattern prospective is known as casemix, which is grouping of diagnoses and procedures with referring to equivalent clinical features and the use of comparable resources. Data source to be entered into the INA-CBGs application comes from medical records, which are summarized in the medical resume. The amount of the INA CBG payment is determined by the severity of the disease, the class of the hospital, and the type of ward used by the patient<sup>13</sup>.

The number of beds determines how the hospital ward is classified. A hospital ward that has six beds within its room is classified as a third-class ward<sup>12</sup>. VIP rooms had one bed, class 1 rooms had one to two beds, and class 2 rooms had two to four beds. Analysis results indicated that factors like amenities and cleanliness in the hospital room influence patient satisfaction. The level of patient satisfaction varied between the types of ward<sup>14</sup>.

The type of wards may be related to LOS in patients. There was no relationship between the type of wards and LOS in diabetic patients<sup>15</sup>, but in COPD patients, the type of ward is a potential predictor of LOS<sup>16</sup>. There was no research about the association between the type of hospital ward and LOS in heart failure. Thus, the aim of this study was to figure out the average length of stay (LOS) in heart failure patients and its association with the type of ward in the PKU Muhammadiyah Yogyakarta hospital.

## **METHODS**

The study took place at PKU Muhammadiyah Yogyakarta Hospital using a cross-sectional design and used retrospective data. The medical records were the source of patient data. Patients classified as having heart failure (I50) by the ICD-10 criteria during the 2021-2024 study period made up this study population. Patients who were hospitalized for primary diagnoses other than heart failure or whose medical records were not completed are excluded from our study.

For each patient, the following data was gathered: year of admission, age, sex, referral from other healthcare facility or come straight to hospital, used national health insurance or not, and hospital ward type (first class, two beds in a room; second class, four beds in a room; third class, six beds in a room, VIP class, one bed in a room). Class III of

ward dominated by patients of Premium Assistance Beneficiaries by Government (PBI), and had the fewest amenities during hospital in-patient<sup>17</sup>. In order to evaluate quality of service care despite of the minimal facilities, we categorized class ward type into 2 groups: group I (non-class III) consists of VIP class, class I, and class II; group II (class III) was class III only. The dates of hospital discharge are subtracted from the dates of hospital admission to determine patients' LOS, and written in days as numeric variables. The elements of each research variable were summarized using descriptive statistics. The mean values ( $\pm$ SD) were used to express the normally distributed data. The skewed data were displayed as an IQR (interquartile range) median value. Both numbers and percentages (%) were used to represent categorical data.

In order to compare the variables dependent between the two groups, the normality of the variable distribution was first tested by Kolmogorov-Smirnov. The independent t-test was used for normal distribution of variables, while Mann-Whitney U test was used for non-normal distribution of variables. A p-value of less than 0.05 was considered statistically significant. Data entry and analysis were done using Windows SPSS version 25. The ethics board of Universitas Ahmad Dahlan (Number 012409300) and PKU Muhammadiyah Yogyakarta Hospital has granted ethical clearance for this study under the reference number 00271/KT.7.4/X/2024.

## **RESULTS**

A total of 196 heart failure inpatients were included in this study in Table 1. The data revealed a variation in the number of admissions over the four years. The highest number of admissions in 2023 with 59 patients, accounting for 30.1% of the total. There were 47 patients (24.0%) who were referral cases. A significant majority of patients were not referred from other health facilities, with 149 admissions (76.0%) being direct. Fifty-nine percent of the 196 patients who met the inclusion and exclusion criteria were men. Furthermore, national insurance coverage was widespread among patients, with 182 admissions (92.9%) having national insurance. The patient population skewed older, with the majority of admissions (126 patients, or 64.3%) being patients over 60 years old. When it comes to ward types, Class III wards were by far the most utilized,



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accommodating 110 patients (56.1%) of all admissions. Class II and Class I wards saw fewer admissions, with 37 (18.9%) and 33 (16.8%), respectively. A smaller segment of the patient population, 16 individuals (8.2%), were admitted to VIP wards. The data on Length of Stay (LOS) indicates that shorter stays are most common. The highest frequency of admissions was for a 4-day stay (40 patients, 20.4%), followed closely by 3-day stays (34 patients, 17.3%).

**Table 1.** Characteristic of Heart Failure: Inpatient

	Characteristic	Frequency	%
Year of admission	2021	54	27.6
	2022	50	25.5
	2023	59	30.1
	2024	33	16.8
Referral patient	Yes	47	24.0
	No	149	76.0
Age	18-45	22	11.2
	46-59	48	24.5
	>60	126	64.3
Gender	Male	117	59.7
	Female	79	40.3
Type of ward	VIP	16	8.2
	Class I	33	16.8
	Class II	37	18.9
	Class III	110	56.1
LOS	1-5 day	137	69.8
	6-10 days	47	23.9
	>10 days	12	6.1
Had national insurance	Yes	182	92.9
	No	14	7.1
Total		196	100%

Table 2 described that among the 196 patients analysed, the mean LOS of admitted heart failure patients was 4,9 days ( $\pm 2.9$ ) with a median of 4,0 days ( $\pm 3,0$ ). According to our study, the number of days in LOS differed between the 4 types of hospital wards (Table 2). But, when we analyzed further the grouping of wards, we had the result that there was no difference in the LOS of heart failure patients between class III and non-class III.

**Table 2.** Association of 2 Groups (Class III vs Non-Class III) of Hospital Ward and Length of Stay (LOS)

Group of Hospital Ward (%)	Type of hospital ward	LOS Mean ( $\pm$ SD) Days	LOS (IQR) Days	
Class III (56.1%)	Class III	5.0 ( $\pm 2.6$ )	4.0 (3.0)	p-value 0.171
	VIP+Class I+Class II	4.8 ( $\pm 3.3$ )	4.0 (3.0)	
	VIP	3.6 ( $\pm 2.5$ )	3.00 (3.0)	
Non-Class III (43.9%)	Class I	5.9 ( $\pm 3.8$ )	4.5 (6.25)	
	Class II	4.2 ( $\pm 2.7$ )	4.0 (3.5)	
Total		4.9 ( $\pm 2.9$ )	4,0 (3,0)	

\*Mann-Whitney U Test, statistical significance was a p-value of less than 0.05.

Table 2 described that among the 196 patients analysed, the mean LOS of admitted heart failure patients was 4,9 days ( $\pm 2.9$ ) with a median of 4,0 days ( $\pm 3,0$ ). According to our study, there were differences of the number of days in LOS between the 4 types of hospital wards (Table 2). The hospital wards are grouped into two main categories: Class III and Non-Class III (which includes VIP, Class I, and Class II wards). For the Class III ward, which accounts for 56.1% of the hospital wards in this dataset, the mean LOS was 5.0 days ( $\pm 2.6$  SD), with a median of 4.0 days (3.0). The Non-Class III wards, comprising 43.9% of the total, show a slightly lower mean LOS of 4.8 days ( $\pm 3.3$  SD) and a median of 4.0 days (3.0). When comparing Class III to Non-Class III wards, the p-value of 0.171 suggested that there was no statistically significant difference in the mean LOS between these two broad categories.

## DISCUSSION

According to this study, the average LOS for patients with heart failure in our setting was shorter. Previous studies reported that patients with heart failure typically stayed at the hospital for 6 days in Dr. Ramelan Navy Hospital, 6.23 days in RSUP DR. M DJAMIL, and 8.8 days in dr. Kariadi Hospital (RSDK) Semarang<sup>7-9</sup>. This differences might be caused by the referral system<sup>18,19</sup>. PKU Muhammadiyah is a class B hospital that received many patients from other hospital by referral system. In this study, we found that 24% of heart failure patients is transferred by other hospital. First, they got care from other hospital, and then transferred to our setting to get more comprehensive treatment. The LOS, which is the amount of time a patient is admitted to the hospital for



a particular ailment, is a critical measure of hospital effectiveness and resource use. Extended hospital stays can raise the risk of hospital-acquired infections, bed occupancy rates, and healthcare expenses<sup>20</sup>. The less time the patient is in the hospital, the more effective and efficient the hospital service can be said<sup>11</sup>.

There are multiple ways that fraudulent activity could affect the length of stay for patients with heart failure. Healthcare staff may purposefully extend hospital stays to maximize reimbursement, especially when fee-for-service payment models are in place<sup>21</sup>. Clinical pathways and case management were linked to shorter hospital stays for heart failure patients<sup>1</sup>.

Our study found that the majority of patients had participated in the National Health Insurance (92.9%), and a quarter of patients came from a referral from other hospitals. The JKN (Jaminan Kesehatan Nasional) program's implementation of national health coverage is a major step in guaranteeing its citizens fair access to medical care<sup>22</sup>. The JKN took a critical role in ensuring access to affordable healthcare services for all citizens, including those with heart failure. The JKN used a competence-based referral system, meaning that, unless there is an emergency, patients must first seek care at primary care centers before being sent to hospitals or specialty clinics<sup>23</sup>. Safeguarding the JKN's integrity and preventing fraud from jeopardizing the effectiveness and quality of heart failure care requires strong oversight and enforcement systems<sup>13</sup>.

Based on our findings, there were no disparities in LOS of heart failure inpatients in ward class III and ward non-class III. This finding was similar to other study in COPD patients<sup>16</sup>. The type of ward class did not affect the type of treatment provided, including the length of stay. Patients of heart failure had the same clinical care that were provided by hospital, except the facility and amenity, such as number of bed in one room<sup>12</sup>. Patients in various ward classes have access to resources that cover more than just medical care, but they also cover different facets of their care setting. Private rooms, special diets, and access to recreational facilities are just a few of the amenities that upper-class wards frequently offer to improve patient comfort and well-being. Patients are categorized according to ward class, which creates a complicated web of variables that can shorten or

lengthen their hospital stay. In upper-class wards, improved monitoring capabilities and instant access to specialized medical care may result in more efficient treatment plans and faster diagnoses, which would shorten the length of stay overall. Good components of the patient's room and thoughts about the potential for companionship were commonly agreed upon, which improved indoor environmental quality can greatly speed up patient recovery, lower stress levels, shorten hospital stays, and increase staff efficiency in providing care<sup>24,25</sup>. It was generally agreed upon that improved indoor environmental quality can greatly speed up patient recovery, lower stress levels, shorten hospital stays, and increase staff efficiency in providing care<sup>26</sup>.

Investigating the relationship between ward class and LOS in heart failure patients in Indonesia is essential for identifying disparities and optimizing healthcare delivery. This information can help in allocating hospital resources more efficiently<sup>27</sup>. By determining the main causes of prolonged LOS in lower-class and upper-class wards, healthcare systems can improve patient outcomes, reduce healthcare funds, and elevate the overall efficiency of care delivery<sup>28</sup>.

This retrospective study, according to the authors' literature search, was the first to describe LOS and the type of hospital ward among Indonesian hospitalized heart failure patients. It is not without limitations. First, the sample size in this study was smaller than in the others, which means that associations might have gone unnoticed. Secondly, only one setting was used for the conduct of this study. Thirdly, this study did not evaluate the clinical marker such as severity of disease, comorbid, and laboratory data that might affect length of stay of heart failure<sup>5</sup>. As a result, the results' generalizability may be restricted.

## CONCLUSION

We found the average LOS of inpatients with heart failure at PKU Muhammadiyah Yogyakarta hospital was 4.9 days, and LOS did not differ among hospital types of wards. Lowering LOS could boost efficiency and lower HF's overall medical expenses. Clinical pathway-integrated interventions may help lower the high LOS.

## CONFLICTS OF INTEREST

The authors declare no conflict of interest.



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## AUTHOR CONTRIBUTIONS

Conceptualization, data analysis, and writing draft manuscript, TAL; writing, review, and editing, MMU and FAM.

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