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The Relationship between Self-Care and LACE Score as the Predictor of Re-Hospitalisation among Heart Failure Patients in Dr. M. Salamun Hospital, Bandung, Indonesia

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ABSTRACT

Background: The unpredictability of heart failure leads to high rates of hospitalisation and re-hospitalisation rates within 30 days ranging from 19% to 25%. The cause of the rehospitalisation of heart failure patients is mainly due to noncompliance with self-care behaviours and poor family support. Studies showed that re-hospitalisation predictors Length of stay, Acuity, Comorbidity and Emergency (LACE) Score can be used to reduce re-hospitalisation and improve self-care skills. However, there is limited study of the combination of patient self-care intervention with LACE to reduce re-hospitalisation rates in heart failure patients. **Objective:** This study investigates the relationship between self-care and LACE score as a predictor of rehospitalisation. **Methods:** A quantitative correlational design was used. Total 25 participants who were readmitted between November and December of 2022 was included in the study. The sampling technique used purposive sampling and Rank Spearman bivariate analysis using IBM SPSS Statistic 29.0. Validated Self-Care Heart Failure Index (SCHFI) and LACE score questionnaires were distributed among the respondents. **Results:** The self-care ability result showed 72% of patients had a poor level compared to 28% having a good level. Nevertheless, the LACE score showed that 80% have a low risk while only 20% have a moderate level of rehospitalisation risk (score is 5-6). With a *p*-value of 0.001, there is a strong correlation between self-care and LACE score as a predictor of rehospitalisation. **Conclusions:** The results showed the projected self-care skills and the LACE score as a predictor of heart failure patients' rehospitalisation will help lower the 30-day readmission rate.

Keywords: Heart Failure; LACE Score; Re-Hospitalisation; Self-Care

INTRODUCTION

Heart failure is a complicated clinical illness involving symptoms and indicators leading from any kind of anatomical or functional dysfunction (Heidenreich *et al*., 2022). This prevalence is increasing more than 10% in individuals over the age of 70 years (Savarese *et al*., 2023). Re-hospitalisation rates for heart failure patients reach 50% within six months of discharge, and 17-45% will die within the first year (Cruz *et al*., 2022). The National Readmission Database used to identify 30-day readmissions showed the rehospitalisation rate for all causes within 30 days of discharge was accounted for 31.4% (5,962) of all causes (Foroutan *et al*., 2023; Turrise *et al*., 2023). Hospital system issues, patient and community system challenges, socioeconomic circumstances, and individual educational credentials all play a role in hospital readmissions (Albinali *et al*., 2023). The other factor of rehospitalisation is noncompliance with self-care behaviours and family support. Non-compliance in medication and self-care in HF patients has been observed in significant numbers (23.5%) (Rehman, 2019). Hospitalisation due to heart failure results in enormous social costs not only for patients, families, and communities but for the entire health care system (Hessel, 2021).

The goal treatment of heart failure patients was to improve health status, quality prevent (Hafkamp *et al*., 2022). The primary management method for heart failure patients is frequent self-care, which develops exercise capacity, reduces cardiovascular risk, and improves health-related quality of life (Zhang *et al*., 2022; Makita *et al*., 2022). Self-maintenance includes continuing regular self-care practices: taking medicine, fluid and salt restriction, engaging in health-seeking activities, and keeping an eye on HF symptoms (Butler *et al*., 2023). Adequate self-care is an important factor to improve health and prevent hospitalisation (Qi *et al*., 2023). Impoverished self-care is an independent predictor of long-term mortality, heart failure hospitalisation, and the total of these outcomes in people with chronic heart failure (Calero-Molina *et al*., 2022).

It is challenging to anticipate and reduce re-admissions in long-term homecare. The LACE score is a predictive index for readmission risk that can enable home care providers intervene with tailored preventive plans (Su *et al*., 2021). The LACE index considers: L (length of stay), A (acuity of admission), C (comorbidities) and E (emergency department visit) (Rajaguru *et al*., 2022a). The LACE index enables clinicians to swiftly and precisely determine an individual's specific risk of a thirty-day readmission. Furthermore, permitting enhanced coordination of care between healthcare providers and the execution of diverse measures may decrease re-admissions among high-risk patients (Fu *et al*., 2023). Decreasing re-admissions not only impacted healthcare costs but, most significantly, enhanced patients' satisfaction (Rajaguru *et al*., 2022b). According to the previous study, the use of the LACE score is straightforward and covers all aspects of relapse risk assessment. The quick checklist method also assists health workers in conducting appropriate risk assessments. Length of stay and severity of previous illnesses are helpful in assessing the patient's previous medical history. Assessment of the patient's comorbidities is helpful in determining the severity of the patient's condition.

METHODOLOGY

The research method used was quantitative correlation, by relating two variables: self-care and LACE score of heart failure patients at Dr. M. Salamun Hospital, Bandung. The population in this study were patients who experienced hospitalisation with a diagnosis of HF in the last month. By applying a purposive sampling technique, with the inclusion criteria of patients who experienced second rehospitalisation and were able to do daily activities, there were 25 patients who experienced a second rehospitalisation during November-December 2022. The objective of this study was to determine self-care skills, the risk of rehospitalisation, and the correlation between the two variables.

The instruments used in this study are the Self-Care of Heart Failure Index (SCHFI) to measure self-care patient ability and the LACE score to measure the risk of rehospitalisation. The Self-Care of Heart Failure Index (SCHFI), containing 21 items total from three dimensions of the SCHFI questionnaire, are as follows: eight questions are related to self-care maintenance, six to self-care management, and six questions to self-care confidence. SCHFI was a standardised questionnaire with an *r* value <0.3, and the reliability test obtained a value of Cronbach's alpha = 0.952. This indicates that this questionnaire was valid and reliable (Vellone *et al*., 2020).

The instrument to measure the risk of Re-hospitalisation is the LACE Index developed by Van Walraven *et al*., 2010 with 4 measurement variables, including Length of Stay, Acuity of Admission, Comorbidity, and Emergency visit in the last 6 months before admission (Struja *et al*., 2020). The LACE Index was a standard questionnaire with a validity test of 0.895 > 0.75 (Su *et al*., 2021).

Data collection was carried out for 3 weeks for 25 respondents, where data was collected primarily and secondarily for patient comorbidity data. Before data were collected, respondents were given an explanation, and after they consented, the questionnaires were distributed. Univariate analysis was performed with frequency distribution of patient demographic data, including age, gender, occupation and education. Bivariate analysis used the Spearman Rank statistical test using IBM SPSS 29.0, which is a correlation test used to find the relationship between ordinal variables.

Ethical Consideration

The present research received ethical approval from Research and Ethics Committee, Dinas Keshehatan TNI Angkatan Udara, RSAU Dr. M. Salamun Bandung, Indonesia with reference number B/1084 X on 25th October, 2022.

RESULTS

The following table shows the demographic data among Heart Failure patients at Dr. M. Salamun Hospital-Bandung.

Table 1: Demographic Data of Heart Failure Patients

Respondent's Characteristic		Frequency (N)	Percentage (%)
Gender	Female	11	44
	Male	14	56
	Total	**25**	**100 %**
Age	40-65	16	54
	>65	9	36
	Total	**25**	**100%**
Education	Elementary School	9	36
	Junior High School	8	32
	Senior High School	6	24
	Bachelor	2	8
	Total	**25**	**100%**
Occupation	Yes	12	48
	No	13	52
	Total	**25**	**100%**

From the demographic results, it is known that the majority of patients are male with an age range of 40-65 years. In educational terms, the majority of respondents have a first education background with almost half of them not employed. In addition to demographic data, univariate analysis also shows the level of self-care of patients and the risk of re-hospitalisation shown in the following table.

Table 2: Self-Care among Heart Failure Patients

Self-Care	Freq.	Percentage (%)
Good	7	28
Poor	18	72
	25	**100%**

The result of this study showed that almost all respondents (72%) or 18 patients had a poor level of self-care. While as many as 7 respondents (28%) have a good level of self-care. This aspect of self-care can be reviewed in aspects of its parts which include the ability of Self Care Maintenance, Self-Management and Self-care confidence shown in table 3 below:

Table 3: Distribution of Self-care Dimensions

Self-Care Dimension	Category	Freq.	Percentage (%)
Self-Care Maintenance	Good	6	24
	Poor	19	76
	Total	**25**	**100**
Self-Care Management	Good	10	40
	Poor	15	60
	Total	**25**	**100**
Self-Care Confidence	Good	17	68
	Poor	8	32
	Total	**25**	**100%**

From the result it is found that self-care maintenance and management skills among HF patients were in the poor category, 76% and 60%. Only the level of confidence in the patient's self-care ability is in the good category as much as 68%. This condition will be discussed further in the discussion section.

The next data shows the results LACE score as predictor of re-hospitalisation risk among Heart Failure Patients. The following table illustrates the result.

Table 4: LACE Score among Heart Failure Patients

Risk of Re-hospitalization	Freq.	Percentage (%)
Low Risk Re-hospitalisation	8	32
Moderate Risk Re-hospitalisation	17	68
High Risk Re-hospitalisation	0	0
TOTAL	**25**	**100%**

From the 25 respondents, it is known that the risk of re-hospitalisation is in the low (32%) and moderate categories (68%). With the range of LACE score (0-4) in the low risk and score (5-6) in the moderate risk category.

Relationship between Self Care and LACE Score

The following table show the bivariate analysis of the Relationship between Self Care and LACE Score as a predictor of Re-hospitalisation among heart failure patient at Dr. M. Salamun Hospital- Bandung

Table 5: The Correlation between SCHFI and LACE Score among HF Patients

Self-Care	LACE Score				Spearman's R	rho test p-value
	Low Risk		Moderate Risk			
	(f)	(%)	(f)	%		
Good	6	24%	1	4%	0.468	0.000
Poor	2	8%	16	64%		

The result revealed that there is a significant relationship between Self Care and LACE Score as a prediction of Re-hospitalisation among heart failure patients with *p*-value 0.000 (<0.05) and a correlation coefficient value of 0.468.

DISCUSSION

Self-Care Among Heart Failure Patients

From the results of the study, it can be seen that the overall level of self-care of patients is in the low (poor) category as much as 72%. These results were obtained from an assessment of the 3 dimensions of self-care contained in the questionnaire, namely self-care maintenance, management and confidence. Each component will be explained in the following section:

Self-Care Maintenance dimensions from the SCHFI questionnaire showed that the majority of patients had a poor category. From the result, almost all patients are not compliant with medication and do not exercise regularly. Almost all patients have difficulty checking signs and symptoms such as weight gain and swollen ankles. There are also many patients who have not done a low sodium diet because they assumed it was only for high blood pressure patients. Likewise with exercise and exercise, many have not done it consistently due to their busy schedules and physical inability (feeling tired). According to a previous study, self-care maintenance affected health status and also had an impact on the patient's recurrence rate (Patel, 2024). Self-care evaluates how well the patient follows a healthy lifestyle, which includes taking their prescription on time, working out frequently, and consuming less salt in their food (Sitotaw, Tsige & Boka, 2022).

In the Self Care Management dimension, the good category was 40%, and the poor category was 60%. From the results of the study, many patients are late to considering that shortness of breath and swelling of the legs are dangerous symptoms in heart failure patients. Regarding fluid and salt restriction, the patient did not know that it would greatly affect the onset of relapse symptoms. These cause the patient's self-maintenance and management conditions to be in the poor category. This self-management examines how the patient perceives their symptoms, including how well they are able to identify symptoms and analyse the data. Self-management may help to initiate an education program before HF patients begin their chronic disease lives as individuals (Chen *et al*., 2024). Chronically ill patients require assistance in order to better comprehend their illness and

make treatment and lifestyle decisions (Koontalay, Botti & Hutchinson, 2024).

The dimension of self-care confidence, from the results of the study, stated that 68% of respondents had a good category and as many as 32% of respondents had a poor category. This self-confidence assesses the patient's response to the symptoms that occur. Following the treatment instructions that have been given is a component of self-confidence that is highest in this dimension (Locatelli *et al*., 2022). The good self-confidence aspect of the patient is the main capital to improve the ability of self-maintenance and self-management. It's possible to increase self-care ability to improve the patient's health status and quality of life and prevent rehospitalisation in the long term (Seid *et al.*, 2023).

Patient's demographic data also affect the patient's level of self-care ability, in line with research from Riegel, Dickson and Vellone (2022) that age and gender factors of heart failure patients are closely related to the patient's self-care ability. Likewise, education and employment factors affect the level of self-care of patients (Amiri *et al*., 2023). The results showed that the majority of respondents had a primary education level (junior high school) with a non-working employment status; this condition related to the low ability of self-care as the results of this study.

LACE Score among Heart Failure Patients

Poor self-care is an independent predictor of long-term mortality, heart failure hospitalisation, and chronic condition of HF patients (Calero-Molina *et al*., 2022). By increasing self-care and the use of predictors of rehospitalisation, it is hoped that it can prevent the increase in the rate of recurrence in heart failure patients. Several models for predicting recurrence and mortality have been created, but they frequently require data that are not readily available during ordinary clinical care. The LACE score has already been proven to predict 30-day readmissions, but it may also be useful for assessing mortality risk (Aubert *et al*., 2022). The current evidence in this study suggests that including a high-risk LACE score enhanced risk prediction and might be used to predict 30-day readmission for chronic illnesses (Rajaguru *et al*., 2022b).

In this study, the LACE Score found that most (68%) or 17 respondents have a moderate risk of rehospitalisation, while (32%) or 8 people have a low risk level. The LACE score, which consists of 4 aspects of assessment in this study (Length of Stay, Acuity, Comorbidity and Emergency visit), shows that the overall Length of stay of patients is in score 3 with an average stay of 3 days. This is an advantage because the length of a patient's stay affects the morbidity rate. A lengthy hospital stay due to heart failure leads to frequent readmissions and a high mortality rate (Tekle, Bekalu & Tefera, 2022). The second aspect of the LACE score is acuity, seen from the last patient to enter the hospital, whether in an emergency condition and enter through the emergency department. From the results of the study, 10 people from respondents came in with severe chest pain and shortness of breath, so they had to be taken to the emergency room. High rates of acute heart failure patients seeking emergency care might result in a composite risk of death from any cause or hospitalisation due to cardiovascular causes within 30 days (Lee *et al*., 2023).

Comorbidities, the third aspect of the LACE Score, show that almost all respondents in this study had more than 1 comorbidity. Most comorbidities are related to the cardiovascular system: hypertension, diabetes mellitus, and a history of heart disease itself, conditions that can aggravate the patient's health status. Common comorbid conditions that increase the readmission burden should be the focus of future treatments to lower readmissions (Belouali *et al*., 2022). The last part of the LACE score is emergency visit, the number of times the patient entered the emergency room in the last 6 months, and it was found that 12 people experienced the emergency event more than 3 times. When patients present to the emergency room with worsening heart failure (WHF), they face an increased risk of hospitalisation and mortality, putting a significant strain on the healthcare system (Metra *et al*., 2023).

Relationship between Self Care and LACE Score among Heart Failure Patients

There was a significant relationship between self-care and LACE score with a *p*-value of 0.000 (<0.05) and a correlation coefficient value of 0.468. This shows efforts to improve patient self-care, and the use of the

LACE score as a predictor can reduce the risk of rehospitalisation in heart failure patients. When patients realised their level of self-care capacity, they could continue to care for themselves after being discharged from the hospital, and the LACE score must be known as a reminder of their risk of recurrence. Considering its ease of use at the bedside, LACE is frequently employed to risk-stratify hospitalised patients with medical disorders. As a result, predicting the probability of a 30-day readmission using the LACE index will be crucial for lowering the future readmission burden on patient care in hospitals (Zhao & Cui, 2022; Song *et al*., 2024). Previous research shows that several countries have used the LACE score parameter to predict readmissions, where the LACE score is a score in predicting readmissions of CHF patients, including length of stay (L), acuity of admission (A), patient comorbidity (C) and emergency department visits in the last 6 months (E). Score 0-4 = Low; 5-9 = Moderate; and score ≥10 = High risk of readmission, which is strongly associated with hospital costs.

Studies conducted in several countries show that approximately 20% of all hospitalised patients are readmitted after 30 days, which is a burden on cost and financial aspects (de Stampa, 2023). The patient's self-care ability at home, especially in assessing the signs and symptoms that appear, is needed to reduce the condition of worsening; due to inadequate post-discharge support, the patients' health deteriorated (Wang *et al*., 2024). Predisposing factors, enabling factors, and need factors are associated with the risk of 30-day all-cause hospitalisation to an acute care hospital for heart failure patients, one of which is the need to improve patients' self-care skills (Turrise *et al*., 2023). The ability to recognise symptoms, find ways to reduce complaints, and the patient's confidence in the success of treatment are believed to reduce the condition of heart failure patients. The study found that the patient's ability to recognise symptoms and try to reduce complaints (self-care maintenance and management) remained in the low category. This was also associated with a large number of patient visits to the emergency room, even though the risk of rehospitalisation was moderate. Improved self-care and the use of LACE score as a predictor were found to be useful in reducing HF rehospitalisation rates (Sharma *et al*., 2022).

CONCLUSION

Improving patient self-care, especially in the ability of self-care maintenance and self-management, is needed to support the prevention of rehospitalisation in HF patients. For patients with low, poor self-care maintenance categories, increased adherence to the therapy regimen is needed. The ability and knowledge to recognise signs and symptoms need to be improved in patients with low self-care skills.

Increased dietary salt and fluid compliance is also needed to improve the patient's self-management ability. The use of effective programs to improve patient self-care (with telemonitoring being one of them) can be used in heart failure patients. Likewise, the use of recurrence predictors such as LACE Score can help increase patient awareness of self-care to avoid rehospitalisation. Efforts to improve self-care in patients can be done in a more effective way, such as the use of digital applications, such as telemonitoring, which can be used to assist patients in carrying out self-care at home. Awareness of signs and symptoms and discipline in carrying out therapy regimens are needed to prevent rehospitalisation in patients. In future, sampling from several hospitals with the same criteria can be taken into consideration for future researchers.

Limitation

The limitation regarding the number of respondents with a second rrehospitalisation criterion in this study suggests that the sample size for this subgroup is small, which may impact the reliability and generalisability of the findings. A low number of cases in this category could lead to statistical limitations, such as reduced power to detect significant associations, increased variability in results, and potential biases in interpretation.

Conflict of Interest

The authors state that they do not have any conflicts of interest.

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