



Nurse-Led Education Improves Self-Management Knowledge in Cardiovascular Inpatients: A Quasi-experimental Study

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Abstract

Cardiovascular disease contributes significantly to global morbidity and repeated hospitalization. Many patients leave hospital ill-prepared to manage their condition independently, highlighting the need for structured predischarge education. Evidence supporting such interventions within Indonesian inpatient settings, however, remains scarce. This study evaluated whether a nurse-delivered educational intervention could enhance self-management knowledge among hospitalized cardiovascular patients before discharge. Using a quasi-experimental pretest-posttest design, sixty patients at a cardiovascular center of public hospital in Padang, Indonesia were enrolled consecutively and divided equally into intervention and control groups ($n = 30$ each). Participants in the intervention group underwent two individualized 30-minute education sessions addressing disease understanding and self-care behaviors, supplemented with a take-home booklet, within the final two days of hospitalization. Controls received usual ward care. A 24-item validated instrument assessed knowledge at enrollment and upon program completion. Baseline self-management knowledge was lower in the intervention group than in the control group (33.33 ± 7.59 vs 39.56 ± 4.61). Following intervention, knowledge scores increased substantially in the intervention group (44.67 ± 4.68), whereas the control group (41.03 ± 4.64). The between group difference in improvement was statistically significant (mean difference = 9.867, $t = 10.64$, $p < 0.001$), with a large effect size (Cohen's $d = 0.927$). A concise, structured nurse-led program administered before discharge substantially enhanced cardiovascular patients' self-management knowledge. Incorporating such educational initiatives into standard predischarge nursing care is strongly recommended.

Keywords: Cardiovascular Disease, Heart Disease, Knowledge, Nurse-Led Education, Self-Management.

INTRODUCTION

Cardiovascular disease (CVD) remains the foremost contributor to global mortality and disability. As of 2023, CVD accounted for 437 million disability-adjusted life years worldwide, a 1.4-fold rise since 1990, with ischemic heart disease, stroke, and hypertensive heart disease among the primary drivers of this burden (Global Burden of Cardiovascular Diseases and Risks 2023 Collaborators, 2025). In Indonesia, the national health survey reported a medically confirmed CVD prevalence of 0.85% in 2023, encompassing hypertension, coronary artery disease, and heart failure as the most frequently diagnosed conditions (Ministry of Health Republic of Indonesia, 2024). Repeated hospitalization, functional decline, and diminished quality of life represent the downstream consequences of poorly



controlled CVD, largely attributable to modifiable risk behaviors such as dietary imbalance, sedentary lifestyle, smoking, and obesity (Kris-Etherton et al., 2021a).

Enabling patients to independently govern their health through self-management is widely regarded as a cornerstone of CVD care. Self-management encompasses disease awareness, medication adherence, physiological self-monitoring, lifestyle modification, and timely engagement with healthcare providers (Jaarsma et al., 2017) (Barnason et al., 2017a). Nonetheless, knowledge deficits remain prevalent. A study of cardiovascular outpatients in Indonesia revealed that most patients lacked the competency to monitor blood pressure, glucose, and cholesterol, stemming from inadequate knowledge and limited access to monitoring equipment (Muliantino et al., 2024). Many patients are similarly discharged without sufficient preparation to sustain self-management at home, heightening their susceptibility to adverse events and readmission (Phongtankuel et al., 2018).

Structured pre-discharge education has emerged as a viable solution. Recent evidence indicates that nurse-led discharge interventions including structured in-person education supplemented with printed booklets and follow-up support are effective in reinforcing medication adherence, lifestyle behavior, and disease self-management among cardiac patients (Laksmi et al., 2025; Ruksakulpiwat et al., 2025) (Lewin et al., 2002). Notably, structured nurse-led discharge education has been associated with markedly lower rehospitalization rates compared to standard care (Barnason et al., 2017a; de Carvalho Costa et al., 2022). The intervention was conceptually informed by the Middle-Range Theory of Self-Care of Chronic Illness, which proposes that effective self-management is supported by three interrelated processes: self-care maintenance, symptom monitoring, and self-care management (Riegel et al., 2017).

Although evidence from high-income countries consistently demonstrates that structured nurse-led discharge education improves self-management and reduces hospital readmission, the applicability of these findings to Indonesian inpatient setting remains uncertain. Cardiovascular care in Indonesia faces unique challenges, including limited availability of structured discharge education, variations in nursing workload, and differences in patients' educational backgrounds and health literacy (Muharram et al., 2024) (Maharani et al., 2019) (Rich et al., 2016). Consequently, many hospitalized patients are discharged without receiving standardized self-management education tailored to their cardiovascular condition. Despite these challenges, empirical evidence evaluating nurse-led educational interventions among hospitalized cardiovascular patients in Indonesia remains scarce (Harmadha et al., 2023) (Muharram et al., 2024).

Addressing this evidence gap is essential for informing context-specific nursing practice and strengthening discharge planning within Indonesian hospitals. Therefore, this study aimed to evaluate changes in self-management knowledge following a structured nurse-led educational program among hospitalized cardiovascular patients. By addressing the limited evidence from Indonesian inpatient cardiovascular setting, this study seeks to provide evidence to support the integration of structured nurse-led discharge education into routine clinical practice.

METHODS

Study Design and Setting

This study employed a quasi-experimental design with a pretest and post-test control group. The study was conducted in the cardiovascular ward of Public Hospital, Padang, West Sumatra, Indonesia, from July to August 2022.



Samples and Criteria

The population consisted of all inpatients with CVD admitted to the cardiovascular ward during the study period. A consecutive sampling technique was used to recruit eligible patients. The sample size was determined based on a previous study by (Meng et al., 2016), which reported a moderate intervention effect on knowledge improvement. Assuming an 80% statistical power, a two-sided significance level of 0.05, and the expected effect reported in the previous study, a minimum of 25 participants per group was required. To account for potential attrition or incomplete data, approximately 20% additional participants were recruited, resulting in a final target sample of 30 participants per group. Patients admitted during the first half of the study period were assigned to the intervention group, while those admitted during the second half were assigned to the control group, to minimize contamination between groups. Inclusion criteria were: (1) diagnosed with CVD (hypertension, heart failure, coronary arterial disease, arrhythmia, pericarditis, endocarditis, or rheumatic heart disease); (2) willing to participate and provided written informed consent. Patients were excluded if they had moderate to severe pain or cognitive disorders that may interfere with the learning process (figure 1).

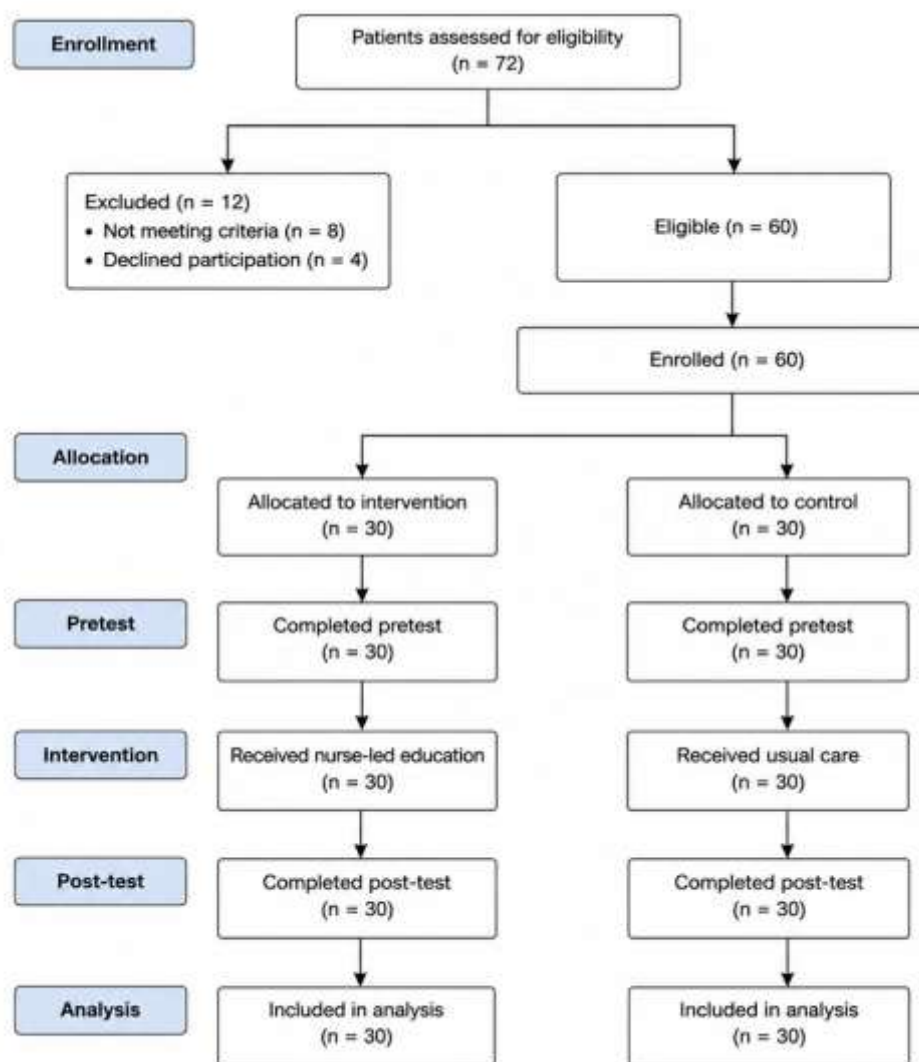


Figure 1. Flow diagram of participant recruitment and follow-up

Intervention

A structured nurse-led educational program was developed based on evidence-based literature on self-management in CVD. The program consisted of two individual sessions, each lasting 30 minutes, delivered to patients in the intervention group within two days prior to discharge. Session 1 covered illness knowledge, including the definition, signs and symptoms, risk factors, complications, and medication adherence related to the patient's specific cardiovascular condition. Session 2 covered behavior knowledge, including self-monitoring of blood pressure and body weight, dietary modification, physical activity, stress management, and when to seek medical help. The educational program was delivered verbally and supported by a booklet provided to each patient for reference at home. The booklet was developed from evidence-based guidelines and reviewed internally by the research team before implementation. It was written in Bahasa Indonesia using simple, patient-friendly language to facilitate comprehension among individuals with varying educational backgrounds. A ward nurse with at least two years of experience in the cardiovascular unit was trained by the research team prior to the study to ensure standardized delivery of the program across all participants. The training covered the study objectives, theoretical basis of the intervention, educational booklet content, standardized teaching procedures, communication strategies, and documentation requirements. The intervention was guided by a written protocol to ensure consistency in the information delivered to all participants throughout the study. The control group received standard hospital care, this typically included brief verbal instructions provided by ward nurses regarding medication use, follow-up appointments, and general discharge advice before hospital discharge. No, structure educational sessions, individualized counseling, or educational booklet were provided to patients in the control group.

Measurement and Data Collection

Baseline data were collected using a self-administered questionnaire capturing demographic characteristics (age, sex, marital status) and health-related information (body mass index, medical diagnosis, and comorbidities). Knowledge of self-management was measured using a questionnaire developed by the researchers based on existing literature on cardiovascular self-management. The instrument was validated on 30 patients with CVD from a different district hospital prior to the main study. Validity testing using Pearson's product-moment correlation yielded correlation coefficients ranging from 0.38 to 0.77, indicating that all items were valid. Reliability testing using Cronbach's alpha yielded a coefficient of 0.77, indicating acceptable internal consistency. The questionnaire comprised 24 items covering two domains: illness knowledge and behavior knowledge. Each item was scored on a three-point scale: do not know (0), no (1), and yes (2), yielding a total score ranging from 0 to 48. A higher total score indicated greater knowledge of self-management. Both groups completed the questionnaire at baseline (pretest) and immediately after the completion of the educational program (post-test).

Data Analysis

Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize demographic and clinical characteristics. Homogeneity of baseline characteristics between the intervention and control groups was assessed prior to the main analysis to ensure comparability between groups. The Chi-square test was applied to examine differences in categorical variables, including age group, sex, marital status, body mass index category, and comorbidity. A p-value greater than 0.05 was considered indicative of homogeneity between groups, confirming that observed differences in post-intervention outcomes were attributable to the intervention rather than pre-existing group differences. Prior to inferential analysis, the normality of the knowledge scores was assessed using the Shapiro-Wilk test. The results indicated that the data were normally distributed ($p > 0.05$) in both groups. A dependent t-test was used to compare pretest and post-test knowledge scores within each group. An independent t-test was used to compare the difference in



knowledge scores between the intervention and control groups. Cohen's d was calculated to estimate the effect size of the intervention. Statistical significance was set at $p < 0.05$.

Ethical Considerations

This study was approved by the Health Research Ethics Committee of Dr. M. Djamil Hospital (No: LB.02.02/5.7/194.2022). All participants provided written informed consent prior to enrollment. Participation was voluntary, and participants were assured of confidentiality and their right to withdraw at any time without consequence.

RESULTS

Table 1 summarizes participant characteristics across both groups. Male participants predominated in both the intervention (76.6%) and control (80%) groups, with most falling within the 46-60 age bracket. Normal body weight (BMI 18.5-24.9) was the most prevalent nutritional status (60% per group), and diabetes mellitus represented the leading comorbidity (26.6% each), though the majority reported no comorbid conditions (intervention: 66.6%; control: 63.3%). Chi-square testing revealed no significant intergroup differences across all baseline variables; age ($p = 0.107$), sex ($p = 0.754$), marital status ($p = 0.301$), BMI ($p = 0.433$), and comorbidity ($p = 0.567$), establishing baseline equivalence between groups.

Table 1. Characteristics respondent

Characteristics	Intervention group (n=30) f (%)	Control group (n=30) f (%)	p value
Age			0.107
24-45 years	3 (10%)	6 (20%)	
46-60 years	10 (33.4%)	15 (50%)	
>60 years	17 (56.6%)	9 (30%)	
Gender			0.754
Male	23 (76.6 %)	24 (80%)	
Female	7 (23.4 %)	6 (20%)	
Marital status			0.301
Married	29 (96.6 %)	27 (90%)	
Unmarried	1 (3.4%)	3 (10%)	
Body mass index			0.433
<18.5 (underweight)	2 (6.6%)	3 (10%)	
18.5-24.9 (normal)	18 (60%)	18 (60%)	
25-29.9 (overweight)	7 (23.4 %)	4 (13.4%)	
>30 (obese)	3 (10%)	5 (16.6%)	
Comorbidity			0.567
Diabetes Mellitus	8 (26.6%)	8 (26.6%)	
Stroke	1 (3.4%)	3 (10%)	
Asthma	1 (3.4%)	0 (0%)	
None	20 (66.6%)	19 (63.4%)	

*Statistically significant $p < 0.05$. Chi square test.

Table 2 presents the within-group comparison of self-management knowledge scores before and after the intervention. In the intervention group, mean knowledge scores increased substantially from 33.33 (SD = 7.59) at pretest to 44.67 (SD = 4.68) at post-test, representing a mean improvement of 11.34 points. This increase was statistically significant ($t = 11.34$, $p < 0.001$). In the control group, mean knowledge scores increased marginally from 39.56 (SD = 4.61) at pretest to 41.03 (SD = 4.64) at post-test, a mean improvement of 1.47 points, which was also statistically significant ($t = 1.47$, $p < 0.001$). The standard deviation in the intervention group decreased notably from pretest (SD = 7.59) to post-test (SD = 4.68), suggesting that the educational program not only raised knowledge scores but also reduced variability among participants, indicating a more uniform level of knowledge following the intervention.



Table 2. Differences of knowledge in self-management between the intervention (n=30) and the control group (n=30)

Knowledge of self-management	Mean (SD)	SE	Mean difference	p value
Control Group			1.47	< 0.001*
Pre test	39.56 (4.61)	0.842		
Post test	41.03 (4.64)	0.847		
Intervention Group			11.34	< 0.001*
Pre test	33.33 (7.59)	1.386		
Post test	44.67 (4.68)	0.855		

Table 3 presents the between-group comparison using the independent t-test. The mean difference in post-intervention knowledge scores between the intervention and control groups was 9.867 (SE = 0.927), with a t-value of 10.64 ($p < 0.001$), indicating a highly significant difference between groups. The effect size was large (Cohen's $d = 0.927$), demonstrating that the educational program produced a clinically meaningful and substantial improvement in self-management knowledge beyond what was observed with standard care alone.

Tabel 3. Effect of nurse-led education of self-management knowledge in patients with CVD

Variable	Mean difference	SE	t	p value	Cohen's d
The knowledge of self-management between the intervention and the control group	9.867	0.927	10.64	<0.001*	0.927

*Statistically significant $p < 0.05$. Independent t-test.

DISCUSSION

This study found that participation in the structured nurse-led educational program was associated with greater improvements in self-management knowledge among hospitalized patients with cardiovascular disease compared with usual ward care. The previous studies showed that clinical-based education effectively improved patients' knowledge about their illness and disease management (Meng et al., 2016). The educational program conducted by (Rosman et al., 2021) using the virtual method for atrial fibrillation patients also showed that most respondents had increasing knowledge of atrial fibrillation and skill of self-management of their disease after being admitted to the educational program. The nurse-led approach may also have contributed to the observed improvement. Nurses maintain continuous contact with hospitalized patients and are well positioned to provide individualized counseling, reinforce educational messages, respond to patients' concerns, and establish therapeutic communication. Such interactions may enhance patient engagement and facilitate knowledge acquisition more effectively than routine discharge instructions (Barnason et al., 2017b). The substantial improvement observed in the intervention group including by teaching personally allowing the nurse to tailor explanations to each patient's clinical condition, educational needs, and level of understanding. Individualized education also provides greater opportunities for patients to ask questions and clarify misconceptions, thereby facilitating more effective learning. Knowledge was an essential part of self-management in patients with chronic disease (Barnason et al., 2017b); (Qiu et al., 2021). Adequate self-management knowledge of patients with the chronic disease would support the implementation of health behavior and regarding specific self-management outcomes (Hwang et al., 2014); Meng et al., 2014; (Moon et al., 2018).

The intervention was delivered during the final days of hospitalization, a period when patients are preparing to transition from hospital-based care to self-management at home. At this stage, educational messages may be perceived as more relevant and immediately applicable. The provision of a take-home booklet likely reinforced verbal education by allowing patients and their family



members to review key information after discharge. The findings are consistent with the Middle-Range Theory of Self-Care of Chronic Illness, which proposes that adequate knowledge is fundamental to self-care maintenance, symptom monitoring, and self-care management. Improved understanding of disease management may therefore represent an important prerequisite for effective long-term self-management (Riegel et al., 2017). Many patients with CVD were not ready for self-management of their illness and undergoing treatment in a hospital after being diagnosed with the disease. This was related to inadequate knowledge about their disease, treatment, care, risk factors, and health behavior modification. So, the healthcare provider must give adequate information about the disease, medication, treatment, care, and secondary prevention for daily health care at home (Peterson et al., 2014). Adequate knowledge can increase the awareness and motivation of patients to apply self-management in everyday life. This effort empowers the patient to maintain their health status independently. A previous study explained that patients who applied self-management could reduce their readmission, re-hospitalization, and recurrent event and improve their quality of life (Bilal et al., 2015); (Riegel et al., 2017); (Barnason et al., 2017b); (Kris-Etherton et al., 2021b).

Although the intervention consisted of only two 30-minute sessions, it produced a substantial improvement in knowledge. This finding suggests that the quality, timing, and individualized nature of education may be more influential than the duration of the intervention itself. Another study showed that educational program was held for an extended period, but they gave to the outpatient of cardiovascular disease and were based on a home education program. Nurses have significant roles in improving patients' quality of life by increasing their awareness of disease risk factors through self-management education programs. Patient education is one of the crucial roles of nurses who can positively change patients' lives by reducing risk behavior, stress, and medical costs, increasing physical activity, and improving their quality of life with better clinical outcomes (Gaudel et al., 2021); (Meng et al., 2016); (Moon et al., 2018).

Implication and Limitation

The findings of this study provide new insight for nurses in managing patients with cardiovascular disease during their opname and preparing their ability to implement self-management when they go home. This study has several limitations that should be considered when interpreting the findings. The quasi-experimental design without random allocation may have introduced selection and temporal bias despite efforts to minimize contamination through sequential group allocation. The study was conducted in a single tertiary hospital, which may limit the generalizability of the findings to other healthcare settings. The intervention was delivered over a relatively short period during hospitalization, and no long-term follow-up was conducted to determine whether the improvement in self-management knowledge was sustained after discharge. The primary outcome was assessed using a researcher-developed questionnaire, which demonstrated acceptable validity and reliability but has not undergone extensive external validation.

CONCLUSION

The findings of this study suggest that participation in a structured nurse-led educational program was associated with greater improvements in self-management knowledge among hospitalized cardiovascular patients. This study recommended continuing educational programs for both inpatients and outpatients to improve the application of self-management in patients with CVD. Given the quasi-experimental design, further randomized controlled trials are warranted to confirm the causal effectiveness of this intervention.



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