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Educational Program to Improve Self-Care in Heart Failure Patients

Dian Hudiyawati[1*], Ida Imamah[2], Sulastri[3], Mazlinda Musa[4], Siti Mutiara Sari Dewi[5], Lia Astuti[6]

[1] *Department of Medical Surgical, School of Nursing, Universitas Muhammadiyah Surakarta, Kartasura, 57162, Jawa Tengah, Indonesia*
[2]*School of Nursing, Universitas Aisyiyah Surakarta, Surakarta, 57146, Jawa Tengah, Indonesia*
[3,5,6]*School of Nursing, Universitas Muhammadiyah Surakarta, Kartasura, 57162, Jawa Tengah, Indonesia*
[4]*Nursing Department, Faculty Medicine Health Science, University Malaysia Sabah, Kota Kinabalu, Sabah, Malaysian*

**Correspondence*: dian.hudiyawati@ums.ac.id

Abstract: *Knowledge of heart failure patients' self-care influences patient adherence and readiness for independent care at home. Self-care enhancement is a significant focus of heart failure management programs. Efforts can be made by providing self-care education using conventional media and the web. This study aimed to determine the effectiveness of web-based versus booklet-based self-care education in improving self-care behaviors among heart failure patients. Using a pretest-posttest experimental design, 76 eligible respondents were divided into two groups: a web-based education group and a booklet-based education group. The questionnaire used the Self-Care Heart Failure Index to measure the patient's self-care score. An Independent t-test was used to analyze differences in self-care scores in the two groups. Of 76 respondents in this study, >50% were male, and most were in the adult age range (36-55 years old). Based on the results of the independent t-test in both groups (web and booklet) showed a significant difference in the mean self-care score (p-value = 0.001). It illustrates that web media is more effective than booklet media. Providing education using media that health workers follow up is important to do as an effort to improve self-care in heart failure patients.*

Keywords: Cardiac failure, Health education, Monitoring, Self-management

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INTRODUCTION

Heart failure is a serious medical condition characterized by the heart's inability to pump sufficient blood to meet the body's needs. It is caused by various factors, including heart attacks, infections, high blood pressure, alcohol or drug use, and hereditary conditions (White, Kirschner, & Hamilton, 2014). Globally, the prevalence of heart failure continues to rise, affecting approximately 26 million people. In the United States alone, 6.2 million individuals are diagnosed with heart failure, contributing to approximately one million new cases and 330,000 related deaths annually (Hamid, Sjattar, & Kadar, 2021; Sohn et al., 2019). In Indonesia, the prevalence of heart disease is reported at 1.5% across all age groups (Kemenkes RI, 2019).

Patients with chronic heart failure (CHF) often exhibit significant deficits in self-care knowledge and skills, which are crucial for managing their condition effectively. Studies have shown that a substantial proportion of CHF patients have poor knowledge about self-care practices. For instance, a study conducted in Ethiopia found that more than half of the participants had inadequate knowledge about self-care, with factors such as age, disease duration, and previous hospitalizations influencing their

knowledge levels (Gebru et al., 2021). Similarly, another study highlighted that CHF patients had low scores in self-care maintenance, management, and confidence, indicating difficulties in implementing self-care knowledge into practice (Raines & Dickey, 2019). These findings suggest that many CHF patients struggle to understand and apply essential self-care practices, which can lead to poor health outcomes and increased hospital readmissions.

Effective self-care is critical in managing heart failure and improving patient outcomes. Self-care behaviors, such as adhering to medications, following a low-sodium diet, engaging in physical activity, monitoring symptoms, and seeking timely medical help, can reduce hospital readmissions, improve quality of life, and lower mortality rates (Gallagher, Luttik, & Jaarsma, 2011; Gebru et al., 2021). However, despite its importance, many patients, particularly the elderly, struggle with self-care due to inadequate knowledge and difficulty distinguishing heart failure symptoms from other conditions (Foster, 2018). Health education plays a vital role in equipping patients with the knowledge and skills needed for effective self-care (Notoatmodjo, 2012).

Various educational methods have been employed, including traditional media like booklets and digital platforms such as websites. Booklets offer a practical, accessible format that patients can refer to repeatedly, making them especially useful for individuals less familiar with technology (Krisnana et al., 2017). Conversely, web-based education provides broader reach, interactivity, and cost-efficiency, making it a promising tool for delivering health information in the digital age (Stellefson et al., 2020). Websites are easily accessible and can be used by patients at their convenience. This allows patients to review the information multiple times, which can reinforce learning and improve self-care practices (Al-Sutari & Ahmad, 2017).

Although both methods have demonstrated potential in improving self-care, limited research has directly compared their effectiveness in the context of heart failure education. This study aims to address this gap by determining the effectiveness of booklet-based and web-based education on self-care behaviors among heart failure patients. The findings will provide valuable insights into optimizing educational strategies to enhance patient outcomes.

METHODS

This study employed an experimental pretest-posttest design with a control group. The population consisted of heart failure patients registered at two heart clinics in Solo Raya: UNS Hospital and Dr. Moewardi Hospital. Both hospitals share similar characteristics, including having specialized heart clinics, serving as referral hospitals in the Solo Raya area, and functioning as teaching hospitals. Participants were selected based on specific inclusion and exclusion criteria. The inclusion criteria included heart failure patients aged over 18 years, those with NYHA (New York Heart Association) functional class II or III, those who could access and use a smartphone, those who were literate, and those willing to participate. Patients with hearing loss or physical limitations preventing self-care were excluded.

The sample size was calculated using the Lemeshow formula, resulting in 73 participants. To account for potential dropouts, the total sample size was increased by 10%, bringing the final total to 81 participants. These were divided into two groups: a booklet group with 40 participants and a web group with 41 participants. Sampling was conducted in two stages. First, the hospitals were randomly assigned to either the booklet or web group using a simple random selection process, such as drawing lots. UNS Hospital was assigned to the booklet group, while Dr. Moewardi Hospital was assigned to the web group. Following this, participants were selected using purposive sampling based on the inclusion and exclusion criteria.

In the booklet group, participants received self-care education through a printed, full-color booklet. The booklet covered essential topics, including heart failure management, diet, physical activity, symptom monitoring, and medication adherence. Participants were instructed to use the booklet as a guide for daily self-care and to document their activities, such as fluid intake, diet, physical activity, and medication, in a logbook or diary.

In the web group, participants received the same educational material through a web-based platform created using the Carrd.co website. This e-media platform was accessible via smartphones. Researchers assisted participants in installing and navigating the platform, which provided the same content as the booklet. Participants in this group recorded their daily self-care activities using a linked Google Form. Weekly reminders were sent via text messages to encourage compliance. Both groups completed a pretest using the Self-Care Heart Failure Index (SCHFI) questionnaire before the intervention. After four weeks, participants completed a posttest using the same questionnaire.

Data collection tools included a demographic and clinical characteristics questionnaire and the SCHFI. The demographic and clinical characteristics questionnaire gathered data on participants' age, gender, education level, employment status, duration of illness, NYHA functional class, and smoking history. The SCHFI is a validated and reliable instrument that evaluates self-care behaviors across three dimensions: self-care maintenance, self-care management, and self-care confidence. It consists of 22 items, with scores ranging from 20 to 80, where higher scores indicate better self-care. Data analysis was performed using SPSS software. Descriptive statistics summarized demographic and clinical characteristics, while chi-square tests assessed the homogeneity of the two groups. Normality of the self-care data was tested using the Shapiro-Wilk test, confirming normal distribution. Paired t-tests were used to compare pretest and posttest scores within each group, while independent t-tests compared the mean differences in self-care scores between the two groups. A p-value of less than 0.05 was considered statistically significant.

Informed consent was obtained from all participants before their inclusion in the study. The study was approved by the ethics committee of Dr. Moewardi Hospital, Surakarta, with approval number 1.112/XII/2022.

RESULTS

The number of respondents selected according to the sample criteria was 81 patients. Simple randomization was done on respondents, obtaining 40 samples for the web group and 41 for the booklet group. Two respondents in the web group dropped out because one respondent did not answer telephone calls during follow-up, and one respondent experienced rehospitalization. In the booklet group, three respondents dropped out because they did not answer telephone calls. The total number of respondents analyzed was 76, with 38 respondents for each group (Figure 1).

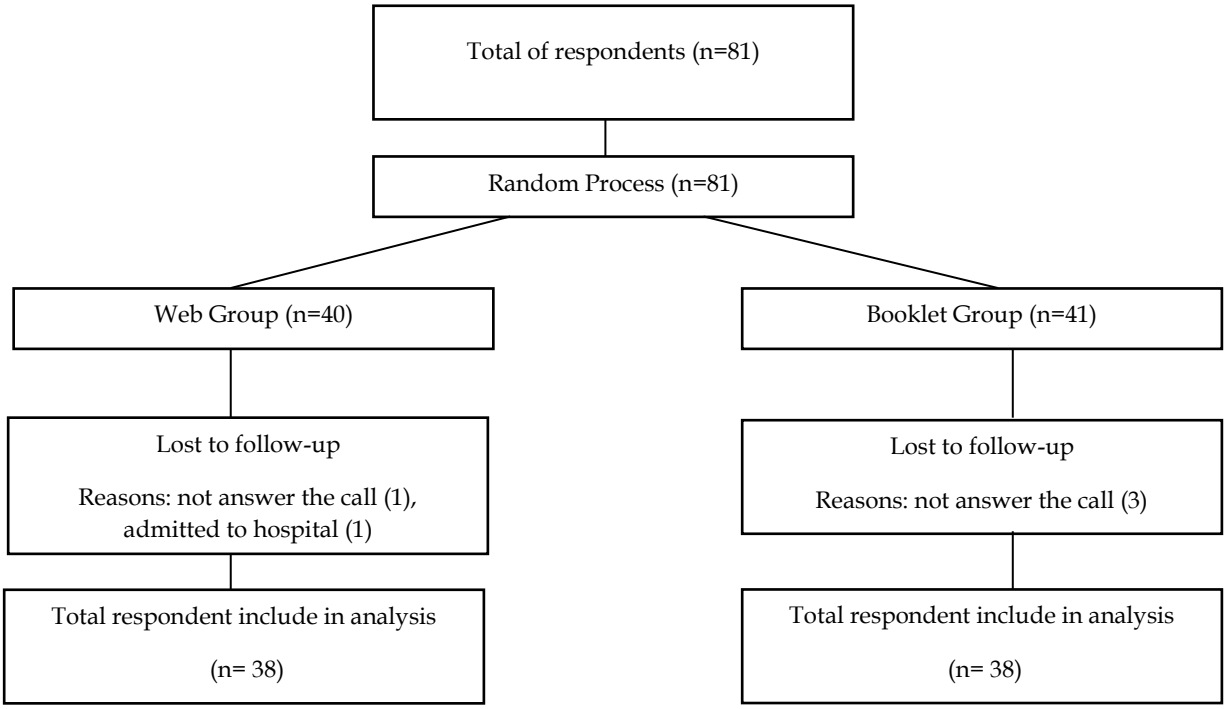

Figure 1. Consort Flow Diagram of Study Protocol

Table 1. Demographic Characteristics Among Heart Failure Patients in the Web and Booklet Groups

Characteristic	Category	Web Group		Booklet Group		*P-value**
		Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	
Gender	Male	18	47.4	22	57.9	0.36
	Female	20	52.6	16	42.1	
Age (years)	17-35	3	7.9	7	44.7	0.19
	36-55	25	65.8	26	42.1	
	>56	10	26.3	5	13.2	
Level of Education	Primary school	15	39.5	17	44.7	0.55
	Secondary school	18	47.7	13	34.2	
	Academic	6	15.8	8	21.1	
Work	Not working	26	68.4	17	44.7	0.08
	Working	12	31.6	21	55.3	
Smoking history	Yes	25	65.8	24	63.2	0.81
	No	13	34.2	14	36.8	
Length of disease	< 5	33	86.8	34	89.5	0.72
	> 5	5	13.2	4	10.5	
NYHA functional class	NYHA II	19	50.0	22	57.9	0.49
	NYHA III	19	50.0	16	42.1	

*Chi-square test

The results of univariate analysis on 76 respondents showed that gender in both groups had a balanced proportion of men and women. The majority of respondents were of adult age (67.1%), only a small proportion of respondents had a bachelor's or diploma level of education (18.4%), more than half of the respondents did not work (56.6%), had a history of smoking (64.5%), had been ill for less

than five years (88.2%). NYHA functional class in both groups had almost equal proportions between NYHA II and III (table 1).

Based on the results of analysis tests for characteristics between the web (n = 38) and booklet (n = 38) groups, there were no significant differences in the categories of age, gender, education level, occupation, smoking history, duration of illness, and NYHA functional class (p > 0.05). So, it can be concluded that the two groups are homogeneous (table 1).

Table 2. Analysis of the Influence of Providing Education Through Booklets and The Web On Self-Care in Heart Failure Patients

Variables	Group	Mean ± SD		
		Pre-test	Post-test	P-Value
Self-care	**Web**	43.89 ± 8.12	53.18 ± 4.67	0.001*
	Booklet	44.25 ± 3.45	47.03 ± 7.81	0.048*
P-value	***Web Vs Booklet***	0.802**	0.001**	

*Paired t-test, **Independent t-test

At the start of the study, both web and booklet groups had homogeneous self-care scores or no significant differences (p-value = 0.802) (table 2). The results of the difference between two means tests using a paired t-test found that the web group experienced a significant change in the average self-care score before and after it was given (p-value = 0.001; difference= 9.29; t= 6.114). It also happened in the booklet group, which showed a significant difference before and after being given education using booklets (p-value = 0.048; difference 2.78; t= 2.007). Based on the independent t-test in the two groups (web and booklet), there was also a significant difference in the post-test results (p-value = 0.001). It can be illustrated that booklet and web media influence changes in the average value of self-care scores. However, the web media group had a more significant score change than the booklet group (table 2).

DISCUSSION

The findings of this study demonstrate a significant difference in the effectiveness of self-care education provided via web-based media compared to booklet-based methods for heart failure patients. At the beginning of the study, respondents' self-care scores were generally poor, reflecting limited control over their symptoms and insufficient physical activity. Despite some understanding of medication adherence and dietary recommendations, the majority of respondents struggled with implementing comprehensive self-care behaviors.

The web group, which received self-care education through a web-based platform combined with weekly reminders to fill out a logbook, showed a significant improvement in self-care scores. The structured monitoring process, including sending short text messages to encourage logbook completion, played a pivotal role in fostering adherence to self-care practices. Initial challenges in completing the logbook were evident during the first week, with over half of the respondents failing to document their activities. However, by the third week, compliance had significantly improved, aligning with an increase in post-test self-care scores. Respondents expressed that receiving regular reminders motivated them to follow self-care practices, as they felt accountable due to the research team's monitoring.

These findings are consistent with the literature. For instance, Nick et al. (2021) highlighted the positive impact of combining educational interventions with remote monitoring on the self-care behaviors of heart failure patients. Similarly, Leutualy et al. (2021) emphasized the effectiveness of telephone calls and text message reminders in enhancing self-care capabilities among cardiac patients. The booklet group also experienced a significant improvement in self-care scores, although the magnitude of change was less pronounced compared to the web group. This aligns with findings by Anggraeni & Syafriati (2022), who demonstrated the benefits of booklet-based health education in improving self-care behaviors in CHF patients. Booklets have been shown to enhance knowledge and

interest, providing a tangible resource for patients to revisit the material at their convenience (Syamsuddin et al., 2021).

Knowledge serves as a foundational domain in shaping behaviors, and self-care in CHF patients is closely linked to their understanding of their condition. Patients with higher levels of knowledge are better equipped to recognize symptoms, understand their treatment regimen, and make informed decisions about their care (Fitriyan et al., 2021). This aligns with self-care theory, which suggests that self-care behaviors are influenced by individual characteristics, such as age, education, and gender, as well as external factors like education and monitoring.

Cognitive theory further supports the idea that experiences and behaviors are shaped by acquired knowledge. Health education fosters paradigm shifts, improves understanding, and encourages positive behavioral changes. Hidayati et al. (2019) found that health education significantly impacts knowledge and attitudes, leading to better health behaviors. Dessie et al. (2021) similarly highlighted the importance of continuous health education in enhancing patient awareness and skills.

The significant improvement in self-care scores observed in the web group can be attributed to the combination of education and regular monitoring. Studies by Sumertini et al. (2022) and Peyman et al. (2020) underscore the role of monitoring in motivating patients and boosting their confidence in self-care. Additionally, leveraging technology, such as smartphones, aligns with modern trends and provides a convenient, accessible platform for delivering educational content. Previous research by Latifi et al. (2021) demonstrated a strong correlation between the use of social media and improved self-care among heart failure patients, particularly during the pandemic.

The use of media, whether web-based or booklet-based, encourages curiosity, facilitates understanding, and promotes the adoption of new behaviors. Effective delivery methods stimulate positive health attitudes and enhance self-care practices. Respondents in this study expressed high levels of satisfaction with the educational materials, emphasizing their accessibility and usefulness. This aligns with findings by Silalahi et al. (2018), who reported that media resources enable patients to revisit and reinforce their learning at home.

CONCLUSIONS

This study underscores the pivotal role of tailored education and consistent monitoring in enhancing self-care behaviors among heart failure patients. The findings demonstrate that web-based education, complemented by regular follow-ups, is significantly more effective than booklet-based methods. This highlights the transformative potential of integrating technology into patient education strategies, making interventions more accessible, interactive, and impactful.

Both educational approaches positively influenced self-care, reinforcing the importance of structured and well-supported interventions led by healthcare professionals. These results emphasize the need to prioritize innovative and integrated methods in patient education, leveraging digital platforms to deliver personalized reminders and ongoing support. Future research should focus on evaluating the long-term sustainability of these educational interventions and exploring their adaptability to other chronic conditions. Additionally, developing advanced, user-friendly media platforms that cater to diverse patient needs could further empower individuals to take active roles in managing their health.

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AUTHOR CONTRIBUTION:

All authors made substantial contributions to the conception and design of the study. DH led the study design, data collection, analysis, and drafted the initial manuscript. INI, DH, and MM contributed to

data validation, interpretation of findings, and critical revision of the manuscript. DH and SS was involved in the development of the theoretical framework and ensured methodological rigor. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work to ensure its accuracy and integrity.

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ETHICAL STATEMENT:

The ethics committee of RSUD, Dr Moewardi Surakarta, has approved the research process, with approval number 1.112/XII/2022.

DATA AVAILABILITY STATEMENT:

The data that support the findings of this study are available from the corresponding author upon reasonable request. Due to privacy and ethical restrictions, participant-identifying information are not publicly shared.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

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