Effects of Predischarge Patient Education Combined With Postdischarge Follow-Ups on Self-Care, Readmission, Sleep, and Depression in Patients With Heart Failure

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Introduction

Although advanced treatments have increased the rate of survival among patients with heart failure (HF; Benjamin et al., 2017), early postdischarge readmissions are common, with 31.9% and 38.5% of patients readmitted within 6 months and 1 year of discharge, respectively (Chang et al., 2017). Many patients experience unresolved symptoms after discharge (Teo et al., 2016), including shortness of breath, difficulty in walking or climbing stairs, fatigue, edema, trouble sleeping, and depression (Huang et al., 2018). Several risk factors for HF readmission have been recognized and categorized into three factor categories, including patient factors (e.g., heart function, comorbidities, advanced age), psychosocial factors (e.g., depression, sleep quality, quality of life), and system-based factors (e.g., hospital size, limited cardiac services, low-income or minority populations; Carlson et al., 2019; Ryan et al., 2019). Active engagement in self-care facilitates symptom management and reoccurrence, which

ABSTRACT

Background: Patients with heart failure rarely engage in adequate self-care. Greater emphasis on self-care discharge readiness is needed.

Purpose: This study examined the effects of a predischarge educational program combined with 1 year of postdischarge follow-up on self-care behaviors, readmission, sleep quality, and depression in patients with heart failure.

Methods: A longitudinal, nonequivalent two-group pretest–posttest design was used. The intervention group received tailored education and follow-ups, whereas the control group received routine predischarge heart-failure education from direct care nurses only. Measurements included the self-care maintenance and self-care management subscales of the Self-Care of Heart Failure Index, Pittsburg Sleep Quality Index, Patient Health Questionnaire-9, and readmission rate. Data obtained at baseline and at 1, 3, 6, and 12 months postdischarge were analyzed using linear mixed models with both intention-to-treat and per-protocol approaches. The propensity score was used to adjust for the confounding effects of the New York Heart Association functional class and left ventricular ejection fraction.

Results: Of the 62 patients with heart failure (28 in the intervention group and 34 in the control group) who were sampled at baseline, 47 (n = 25 vs. n = 22) provided data over the entire course of this 1-year study (76% retention rate). The per-protocol analysis did not find significant differences for any variables. However, the intention-to-treat analysis showed that the intervention group significantly improved in self-care maintenance at 6 months and self-care management at 12 months after hospital discharge, with fewer, albeit not significantly fewer, first and subsequent hospital readmissions than the control group.

Conclusions/Implications for Practice: The effect of this intervention was not found to be substantial, indicating a need to design more efficacious and powerful interventions. Hospitalized patients must receive patient education before discharge to foster their self-care knowledge and skills regarding self-care at home. Strategies are needed to help nurses provide patient education in a time-efficient manner.

Key Words: heart failure, predischarge patient education, postdischarge follow-up, self-care, readmission.
prevents or slows deterioration, improves functional capacity, improves quality of life, and minimizes the impact of patient factors associated with readmission (Riegel et al., 2016; Ryan et al., 2019).

However, patients with HF engage only rarely in adequate self-care (Köberich et al., 2015; Tsai et al., 2015). Thus, greater emphasis on self-care readiness at discharge is needed. HF self-care includes behaviors related to medication administration, dietary choices, fluid control, exercise, symptom monitoring and management, and behaviors requiring lifestyle changes (Riegel et al., 2011). Patients must be empowered to implement self-care behaviors and be supported to integrate self-care recommendations into daily routines. For patients with HF, the challenges and obstacles begin after hospital admission and continue after their return to community and home settings (Nadrian et al., 2018; Ponikowski et al., 2016).

A well-organized predischarge educational program is important for hospitals that have limited numbers of professionals available for home-based intervention programs. Because HF is characterized by unexpected exacerbations, postdischarge telephone follow-up may contribute to the success of related predischarge educational programs (Liou et al., 2015). Domingues et al. (2011) found that hospital-based educational nursing interventions for patients with HF followed by telephone monitoring after discharge improved HF awareness and self-care knowledge scores but did not significantly reduce rates of emergency room visits, rehospitalizations, or deaths. Köberich et al. (2015) found that a single educational session coupled with consecutive telephone follow-ups improved overall self-care behaviors but had no impact on quality of life. Liou et al. (2015) found that inpatient education, using a videotape or a teaching booklet combined with telephone follow-ups, effectively promoted self-care in patients with HF but did not affect hospital readmission or the mortality rate at 3 months. Although prior studies have measured the short-term impact of educational interventions on patients with HF, a longer period of observation is necessary to advance scholarly understanding of the effects of these interventions on the self-care behaviors of patients with HF.

Therefore, the purpose of this study was to examine the effects of a predischarge educational program combined with 1 year of postdischarge follow-up on self-care behaviors, sleep quality, depression, and readmission in patients with HF. The primary outcomes were self-care maintenance, self-care management, and readmissions. The secondary outcomes were sleep quality and depression.

The readmission rate for patients with HF is higher in Taiwan than in many other countries (Chang et al., 2017). Nearly 10% (9.7%) of Taiwanese patients with HF are readmitted more than once within 1 year of discharge. This high rate of readmission suggests inadequate discharge preparations and a need to begin the predischarge planning process earlier after admission (Ryan et al., 2019). Nurses play an important role in providing predischarge education aimed at modifying self-care behaviors after discharge (Albert et al., 2015). However, many clinical practice nurses carry heavy workloads already and may lack time to provide additional patient education. Moreover, many nurses lack the confidence and teaching materials necessary to convey relevant self-care knowledge and skills (Che et al., 2016). In response to this problem, a patient-focused self-care pamphlet was developed as part of a predischarge HF educational program (Ponikowski et al., 2016). The hypothesis was that improving the quality and timing of teaching materials and conducting postdischarge nursing follow-ups would improve clinical outcomes.

Methods

Study Design

A longitudinal, nonequivalent, two-group, pretest–posttest design was used, and data were collected from November 2012 to February 2015.

Setting and Samples

Patients who were diagnosed with HF before admission to one of two medical centers in southern Taiwan were invited to participate. Adult patients 20 years or older were included if they were classified as II or higher on the New York Heart Association (NYHA) functional classification based on the International Classification of Diseases, Ninth Revision (Code 428) and were able to communicate in either Mandarin Chinese or Taiwanese without shortness of breath. Patients with a diagnosis of dementia, psychological impairment, or musculoskeletal limitations such as hemiplegia as noted in the medical record were excluded. Subjects were assigned to either the control group or the intervention group using computer-generated random numbers. Post hoc power analysis was calculated using Power Analysis and Sample Size 2008 software (NCSS, Kaysville, UT, USA). At a significance level of .05, with sample sizes of 22 completers in the control group and 25 completers in the intervention group, 5 points of means and standard deviations, and repeated-measures analysis of variance, the effect sizes estimated were 2.04 for self-care maintenance, 1.15 for self-care management, 0.94 for sleep quality, and 0.89 for depression. The post hoc power was calculated based on the Greenhouse–Geisser corrected F test (Mueller et al., 1992), and the preceding parameters were 100% for all variables except for readmission. The power for readmission achieved only 35% based on the Cox regression analysis with the log odds ratio, a standard deviation of 0.50, an anticipated event rate of 0.50, and a significance level of .05 to detect a regression coefficient equal to 1.00 (Hsieh & Lavori, 2000).

Intervention

The control group received routine, predischarge HF education from direct care nurses and were provided a one-page discharge information sheet that emphasized self-care behaviors, including medication adherence, low-salt dietary restrictions, fluid restrictions, and engaging in physical activity. The intervention group received tailored education and follow-up by
either the principal investigator or a trained advanced care cardiac nurse that began on the day immediately after admission. The educators reviewed the information included in the study pamphlet, which was printed in full-color, pictorial format and a large font size for ease of reading. A previous review by two cardiologists and three advanced care cardiac nurses earned the pamphlet a content validity index of 1.0. The intervention group received five postdischarge follow-ups, which consisted of one-on-one, self-care consultations (Figure 1).

**Measurements**

In addition to demographic data, information related to heart status, including ejection fraction and comorbidities, was obtained from patient medical records. Dates and frequencies of readmission were simultaneously collected from the patients and their medical records at each data collection point. Three instruments were used to measure the clinical outcomes of self-care ability, sleep quality, and depression.

**Self-Care**

Self-care included maintenance and management and was measured using the respective subscales of the Self-Care of Heart Failure Index (Riegel et al., 2009). The 10-item self-care maintenance subscale was designed to determine the frequency of engagement in self-care behaviors that promote health maintenance such as medication adherence, body weight and edema monitoring, water and sodium intake restrictions, and regular exercise. The five-item self-care management subscale was designed to describe the participants’ actions in response to HF symptoms that worsened or reoccurred during the past month. Each item on these subscales is scored from 1 to 4 (1 = never or rarely, 4 = always or daily), and subscale total scores are converted to standardized scores ranging from 0 to 100, with higher scores indicating better self-care; scores above 70 represent adequate self-care (Riegel et al., 2009). The 15 items have been translated and used in Taiwan (Tsai et al., 2015). The Cronbach’s alphas for these subscales were .80 for maintenance and .68 for management in this study.

**Sleep Quality**

The Chinese version of the 19-item Pittsburg Sleep Quality Index (PSQI; Buysse et al., 1989) was used in this study to measure sleep quality. The PSQI consists of a patient report of sleep, including duration, latency, efficiency, and disturbances; use of medications; daytime dysfunction; and subjective sleep quality. Each component is scored on a scale ranging from 0 to 3, and the seven component scores of 18 items are summed to produce a global score ranging from 0 to 21. Higher scores indicate worse sleep quality, and a score higher than 5 indicates poor sleep quality. The Chinese version of the PSQI was translated and validated by Tsai et al. (2005), with a Cronbach’s alpha of .72 for 51 primary insomniacs. The Cronbach’s alpha for this measure was .79 in this study.

**Depression**

The Chinese version of the nine-item Patient Health Questionnaire (PHQ-9) developed by Kroenke et al. (2001) was used in this study to measure depression. The nine symptoms include little interest or pleasure in doing things; feeling down, depressed, or hopeless; feeling tired or having little energy; and having a poor appetite or overeating. These factors are ranked from 0 (not at all) to 3 (nearly every day), for a possible total score ranging from 0 to 27. A higher score indicates a greater tendency toward depression, and a score ≥ 10 is indicative of clinical depression. In a previous study on 76 cardiac surgery patients, the Chinese version of the PHQ-9 earned a Cronbach’s alpha of .78 (Liao et al., 2018). In this study, the Cronbach’s alpha for this measure was .84.

**Procedure**

After obtaining approval to conduct the study from the participating hospitals (KMUH-IRB-20120209 and A-ER-102-176), hospitalized patients with HF were referred to the study by cardiologists and nurse practitioners, and their informed consent was obtained. To minimize both expectation and answer bias, questionnaire collection and patient education were performed by different personnel. Research assistants, trained by the principal investigator to ensure the integrity of the research, recruited participants, obtained informed consent, and collected the data. Patients who agreed to participate then completed the pretest questionnaires. Participants in the intervention group were contacted by one of the cardiac educators, and a mutually agreeable time was set for the educational program. After the one-on-one education, the HF booklet was left with the participant. Five telephone follow-ups were completed by the cardiac educators. Data collection interviews were completed at 1, 3, 6, and 12 months after discharge during participant visits to the outpatient department or during home visits. If the participants were readmitted and agreed to continue, data collection continued. All of the participants were compensated the equivalent of 6 USD during each visit.

**Data Analysis**

The demographic characteristics of patients with HF in each group were summarized and compared using Chi-square and Mann-Whitney U tests. Self-care maintenance and management as well as the PHQ-9 and PSQI scores at baseline and at 1, 3, 6, and 12 months postdischarge were analyzed using linear mixed models with two factors (intervention method and time) and their interactions, whereas propensity scores were estimated using logistic regression analysis adjusted for NYHA functional classification and left ventricular ejection fraction. All of the enrolled participants were examined for the outcome variables using intention-to-treat (ITT) analysis. Participants who did not provide data at each of the four follow-ups were excluded from the per-protocol (PP) analysis. Model-building strategies followed the steps suggested by Amorim and Cai (2015). Multiple imputation methods
(the Markov chain Monte Carlo method and regression) were applied to address the missing data. The final data set was based on 100 imputations. When interactions were significant, post hoc comparisons of change over time compared with the baseline were performed. Characteristics of the first three readmissions for HF were evaluated using the Cox proportional hazards model; the Anderson and Gill (AG) model; the Prentice, Williams, and Peterson total time model; and the Prentice, Williams, and Peterson gap time (PWP GT) model (Sun & Cotton, 2010). Kaplan–Meier survival curves were plotted to

Figure 1
Study Flow Chart
compare the times of first readmission between the two groups. SAS 9.4 (SAS Institute Inc., Cary, NC, USA) was utilized for data analysis, with the significance value set at < .05.

Results

Ninety-two patients were referred by cardiologists and nurse practitioners and screened for eligibility, with 73 patients meeting the inclusion criteria. Eleven patients declined to participate, leaving 62 eligible participants. However, after assignment and informed consent, three participants assigned to the intervention group asked to be part of the control group. At baseline data collection, the control group (n = 34) and intervention group (n = 28) were not equivalent. There was no difference between the groups in terms of mean age, gender, living arrangements, financial status, or education (Table 1). However, the control group included an insignificantly higher number of participants classified as NYHA Class IV and an insignificantly higher mean ejection fraction score than the intervention group. There was no difference between groups at baseline in terms of self-care maintenance or management, sleep quality, or depression (Table 2). Fifteen participants withdrew over the course of the study (76% retention rate). Baseline data between the withdrawn group and the completed group were compared. The results showed only gender to be significantly different between the two groups ($\chi^2 = 7.47, p < .01$), with women (n = 10) withdrawing at a higher rate than men.

Self-Care Maintenance

After discharge, the intervention group reached a cutoff score of 70 for each time point. The ITT and PP analyses provided different results for the linear mixed model analysis of self-care maintenance. Whereas the PP approach did not find a significant interaction effect ($F = 2.35, p = .057$) after adjusting for the propensity score, ITT revealed that the changes over time from the baseline to 12 months differed between the intervention group and the control group ($F = 4.22, p = .003$). Post hoc comparisons showed that group differences over time were significant at 1, 3, and 6 months, indicating that the intervention affected the self-care maintenance of participants. However, the effect did not persist after 6 months posttest (Table 3).

Of the 10 self-care maintenance behaviors, four (monitoring weight daily, avoiding illness, eating a low-sodium diet, and asking for low-sodium food when eating out) exhibited significant intervention–time interactions ($p < .05$) in the linear mixed model analyses, showing the improvement in the intervention group in these four self-care maintenance behaviors.

Table 1

Demographic Characteristics and Disease Variables of Participants, by Group (N = 62)

| Characteristic                        | Intervention Group (n = 28) | Control Group (n = 34) | $\chi^2$ or $Z$ | $p$ |
|--------------------------------------|----------------------------|------------------------|----------------|-----|
| Age (years; M and SD)                |                            |                        |                |     |
| Range                                | 56.4 (35.1–80.4)           | 58.2 (28.4–79.7)       | −0.59          | .552|
| Male                                 | 21 (75.0)                  | 18 (52.9)              | 1.71           | .220|
| Married                              | 15 (53.6)                  | 21 (61.8)              | 0.42           | .608|
| Living with family                   | 23 (82.1)                  | 32 (94.1)              | 2.20           | .228|
| Employed                             | 18 (64.3)                  | 22 (64.7)              | 0.001          | 1.000|
| Adequate financial status            | 21 (75.0)                  | 19 (55.9)              | 2.45           | .182|
| Education                            | 8 (28.6)                   | 16 (47.1)              |                |     |
| Elementary                           |                            |                        | 2.21           | .191|
| High school or above                 | 20 (71.4)                  | 18 (52.9)              |                |     |
| NYHA class                           |                            |                        | 3.13           | .209|
| II                                   | 14 (50.0)                  | 15 (44.1)              |                |     |
| III                                  | 12 (42.9)                  | 11 (32.3)              |                |     |
| IV                                   | 2 (7.1)                    | 8 (23.5)               |                |     |
| Left ventricular ejection fraction (%) | 39.9 (19.6–70.8)          | 47.5 (13.0–76.8)       | −1.52          | .128|
| Range                                |                            |                        |                |     |
| Interquartile range                  | 31.0–45.7                  | 31.5–62.9              |                |     |
| Charlson Comorbidity Index           | 2.8                        | 2.4                    | 3.5            | 2.5  |
|                                      |                            |                        |                | −1.18| .239|

Note. Chi-square test was used for categorical variables; Mann–Whitney U test was used for continuous variables. NYHA = New York Heart Association.
Self-Care Management
After discharge, the intervention group reached a cutoff score of 70 for each time point. Similar to the finding for self-care maintenance, the ITT but not PP analysis showed a significant difference in self-management changes over time between the intervention group and the control group ($F = 2.65, p = .035$). Post hoc comparisons identified a significant interaction between group and time at the 12th month (Table 3).

Sleep Quality
Forty-two (68%) of participants reported poor quality of sleep, with a PSQI score greater than 5. Twenty-four of these participants were in the control group, and 18 were in the intervention group. The linear mixed model analysis of the PSQI using ITT and PP approaches indicated no significant differences in changes over time between the groups (Table 3).

Depression
Symptoms of clinical depression, indicated by a PHQ-9 score greater than 10, were reported by 35% ($n = 22$) of the participants. However, the analysis of PHQ-9 scores did not show significant differences in change over time between the groups using either the ITT or PP approach (Table 3).

Heart-Failure-Related Readmissions
Seven participants in the intervention group were readmitted for HF during the year compared with 12 participants in the control group (Table 4 and Figure 2). Among these, two in the intervention group and five in the control group were readmitted more than once during the 1-year period. The average time to first readmission was 4.6 months for the intervention group and 3.3 months for the control group. The censored observations were the 43 participants who were never readmitted. The time to first readmission model (Cox proportional hazards model) showed that the intervention group had 53% fewer, albeit not significantly fewer, first readmissions than the control group (hazard ratio = 0.47, 95% CI [0.17, 1.26]) after adjusting for the NYHA functional classification and left ventricular ejection fraction. The time to the first three readmissions model (AG, AG with robust sandwich estimator, and PWP) showed that the intervention group also had fewer first three readmission events (AG = 0.39, 95% CI [0.16, 0.92]; PWP TT = 0.52, 95% CI [0.23, 1.17]; PWP GT = 0.49, 95% CI [0.22, 1.08]). None of the participants in the intervention group required more than two readmissions over the year compared with the five participants in the control group with three hospital readmissions each.

Discussion
Compared with the data provided by Reyes et al. (2016) on the demographics of Asian patients with HF, the participants in this study were younger and included more women. However, Yu et al. (2011) reported that 58% of the participants in their epidemiological study were men, with an average age of 62 years, which is similar to this study. The age of hospitalized patients with HF is decreasing (Yu et al., 2011).

To reduce the bias results caused by a single analysis, both ITT and PP approaches were used in this study for data analysis, with propensity scores estimated with the NYHA status and left ventricular ejection fraction used to adjust for confounding effects and to increase precision, compensating for the nonrandomized research design (D’Agostino, 1998).
Results of PP analysis estimate the true effect of an intervention for participants who complete the full course of a study. However, this analysis approach is not appropriate for studies affected by high dropout rates, as real-world treatment effects may be overestimated (Ranganathan et al., 2016). Although ITT analysis is suitable for randomized clinical trials, it has been recommended for nonequivalence trials because it takes into account the degree of noncompliance. Therefore, a full analysis was conducted in this study using ITT using multiple imputations of the missing data (Porta et al., 2007). The discrepancies between these two analyses were the findings of self-care maintenance and self-care management. This result differs from previous studies by showing that the PP analysis provides promising outcomes (Porta et al., 2007). It is possible that more participants in the control group complied with self-care requirements and completed the full course of the study.

Table 3
Results of a Two-Factor (Intervention and Time) Linear Mixed Modeling Analysis of Outcome Data for Participants

| Effect | Self-Care Maintenance | Self-Care Management | Sleep Quality | Depression |
|--------|------------------------|-----------------------|--------------|------------|
|        | ITT                   | PP                    | ITT          | PP         | ITT        | PP          | ITT        | PP         | ITT        | PP         |
|        | F  p                  | F  p                  | F  p         | F  p       | F  p       | F  p       | F  p       | F  p       | F  p       | F  p       |
| Intervention | 4.61  .036 | 8.98  .004** | 2.46  .122 | 4.93  .031 | 1.73  2.79 .101 | 4.56  .036* | 5.64  .021* |
| Time    | 29.43 < .001*** | 25.51 < .001*** | 11.78 < .001*** | 10.59 < .001*** | 2.11  .082 2.07 .088 2.78 .028* 1.98 .100 |
| Intervention × Time | 4.22  .003** | 2.35  .057 | 2.65  .035* | 2.56  .065 | 0.31  .872 0.31 .874 0.77 .549 | 0.90 .466 |
| Propensity score | 1.51  .223 | 3.50  .067 | 0.35  .558 | 1.44  .235 | 0.48  .492 0.06 .810 0.02 .876 | 0.12 .728 |
| Post hoc comparisons (IG vs. CG) | | | | | | |
| Baseline to 1 month | 13.95 < .001*** | 0.75  .453 | | | | |
| Baseline to 3 months | 11.71 < .001*** | 1.13  .261 | | | | |
| Baseline to 6 months | 5.78  .017* | 1.45  .149 | | | | |
| Baseline to 12 months | 1.77  .184 | 3.07  .002** | | | | |

Note. Data reflect 100 imputations. IG = intervention group; CG = control group; ITT = intention-to-treat analysis (n = 62); PP = per-protocol analysis (n = 47).

\*p < .05. \**p < .01. \***p < .001.

Table 4
Comparisons of the First Three Readmissions Between the Intervention Group and the Control Group (N = 62)

| No. of Readmissions | Intervention Group (IG) | Control Group (CG) | Time to the First Readmission | Recurrent Events Model |
|---------------------|--------------------------|--------------------|-------------------------------|------------------------|
|                     | n | Average Time to Readmission (Months) | n | Average Time to Readmission (Months) | IG vs. CG | IG vs. CG |
|                     |    |                                     |    |                                     | Variable | B         | Hazard Ratio (95% CI) | Hazard Ratio (95% CI) |
| 1                   | 7  | 4.6                                 | 12 | 3.3                                 | Group    | −0.76    | 0.47 \[0.17, 1.26\] | 0.39 \[0.16, 0.92\] |
| 2                   | 3  | 8.3                                 | 5  | 4.2                                 | Propensity score | −0.93    | 0.40 \[0.02–0.91\] | 0.52 \[0.23, 1.17\] |
| 3                   | 0  | n/a                                 | 5  | 8.4                                 |          | 0.49 \[0.22, 1.08\] |                        |                        |

\* Cox model, adjusted for New York Heart Association functional class and left ventricular ejection fraction. \* Anderson and Gill model. \* Prentice, Williams, and Peterson total time model. \* Prentice, Williams, and Peterson gap time model.
Self-Care Maintenance

At baseline, the mean self-care maintenance score indicates that the participants practiced inadequate self-care (score < 70) and that they likely did not engage in self-care behaviors before hospitalization. The intervention group reached and exceeded the cutoff score of 70 after discharge during the 12-month follow-up. The control group failed to reach the cutoff score, reporting an inadequate self-care status throughout the entire study. However, the PP analysis did not identify a significant difference in self-care maintenance between the two groups. According to the ITT analysis, although the education intervention improved self-care maintenance 6 months after discharge from the hospital, that improvement was not significantly sustained at 12 months. Initiating and sustaining self-care practices is a challenge if not continuously supported and encouraged. Therefore, empowerment throughout the HF trajectory with sufficient support from family and healthcare providers is necessary to initiate and sustain the self-care engagement of patients (Jaarsma et al., 2017).

Four self-care maintenance behaviors, including monitoring weight daily, avoiding illness, eating a low-sodium diet, and asking for low-sodium food when eating out, achieved sustained and significant improvements over the 1-year period of this study. Similarly, Shao et al. (2013) found that, 12 weeks after a self-management program, patients with HF showed significantly improved self-efficacy with regard to sodium and fluid control and consequently had fewer HF-related symptoms. In one large international study covering 15 countries, although poor adherence to most self-care behaviors was found regardless of country, Taiwanese participants had the highest percentage of adherence to HF behaviors in terms of restricting sodium intake (91%), performing regular exercise (68%), monitoring weight (74%), and getting a flu shot (53%; Jaarsma et al., 2013).

Self-Care Management

At baseline, self-care management for the participants in this study fell below the cutoff score of 70, indicating poor self-care management. However, the intervention group improved self-care management from 1 month after discharge, suggesting the sustained effect of this educational intervention on self-care management. The finding that the between-group difference was present only at Month 12 may indicate a delayed effect of this educational intervention on self-care management. In addition, over the yearlong follow-up period, individual medical management of each participant’s HF may have changed with the addition of diuretics prescribed by physicians.

Sleep Quality and Depression

More than 73% of patients with HF report sleep disturbances (Lainsamputty & Chen, 2018), which is similar to the findings
of this study. Clinical HF symptoms such as orthopnea and nocturia may interfere with sleep quality. However, sleep quality is a multifaceted issue, which may explain the lack of a direct effect of HF education on this outcome measure. Furthermore, one third of participants in this study reported signs of clinical depression, a finding that is higher than a study conducted in the United States. Bhatt et al. (2016), using a cutoff score of 10 or more on the PHQ-9, reported a depression prevalence of 26% among patients with HF. The rate of depression among patients with HF is more than twice that of the general population. There was no effect of the educational intervention on the prevalence of depression, suggesting that depression may be a mediator of self-care practices. Further investigation with larger sample sizes is needed.

Heart-Failure-Related Readmissions
Prevention of early readmission is an important goal of HF treatment (Ponikowski et al., 2016). Although not significant, participants receiving the educational intervention were less likely to be rehospitalized and had a longer time to readmission during the 1-year follow-up period. Telephone follow-ups and access to consultation services provide opportunities to ask and clarify questions such as how to address symptom recurrence or a worsening of current symptoms. In this study, participant skills in symptom management, attitudes toward self-care, and decision-making knowledge were reinforced during follow-up visits.

Limitations
The nonequivalent control group design may have introduced bias because of an imbalance in important prognostic factors between the intervention and control groups. In the future, a randomized clinical trial with a larger sample size should be conducted to validate the findings of this study. Retention strategies to maintain participants in studies are needed, as the dropout rate in this study was high, especially in the control group. The results regarding readmission had low statistical power to detect the difference and should be interpreted with caution.

Conclusions
Overall, the effect of this study intervention was not substantial in terms of improving self-care, sleep quality, depression, and readmission, indicating the need to design more efficacious and powerful interventions. However, the finding that participants with HF who received the focused educational program were more likely to report appropriate self-care practices and to have fewer readmission events over the course of a year highlights the importance of predischarge educational interventions. Adding nurse-led postdischarge follow-ups may help patients better manage symptom reoccurrence and further postpone HF readmissions.

Implications of the Findings
It is important that hospitalized patients receive education that promotes self-care knowledge and home-care-related skills before hospital discharge. Thus, nurses should be encouraged to provide patient-appropriate, predischarge educational programs. Strategies are needed to help nurses provide patient education in a quick and effective manner. For example, well-illustrated educational pamphlets, videos, or phone apps given to patients and families on the first day of hospitalization may help patients understand the critical issues before attending the educational session. Finally, postdischarge follow-ups and available consultation services should be offered to clarify questions.

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