

Effect of Home Care After Cardiac Surgery

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Cardiac surgery is among the commonly used methods to treat cardiovascular diseases.¹ Levels of cardiac surgery range from 0.5 per million in the low- and lower-middle-income countries (population of 1.6 billion) and 500 per million in the upper-middle-income countries (population of 1.9 billion).² Although cardiac surgery can be effective in treating cardiovascular diseases,³ it leads to a decrease in patients' self-care ability and causes some changes in the physical and psychological functionality of the individual.⁴ Because patients who have undergone cardiac surgery are usually discharged home within 3 to 7 days,⁵ they may experience a series of symptoms at home after discharge, such as pain, wound infection, edema, dyspnea, arrhythmia, constipation, loss of appetite, and sleep disturbance, and these symptoms may negatively affect their self-care ability and self-efficacy.^{4,6-9} The concept of self-efficacy, first introduced by psychologist Albert Bandura, is defined as the perception or judgment of being able to reach a specific goal¹⁰ and as the belief that one can overcome difficult tasks and exhibit motivating behaviors to achieve one's goals.¹¹ In the literature, it has been suggested that cardiac surgery patients with high levels of self-efficacy adapt better to changes following surgery. For patients to develop self-efficacy, they must have the necessary knowledge and skills to adopt lifestyle changes, and maintaining an independent life is important after cardiac surgery¹² because the results of some studies have shown that low self-efficacy is related to a high probability of hospital readmission.¹³⁻¹⁵ Improved self-efficacy has also been reported to decrease the probability of readmission after cardiac surgery.¹⁶ Overall, study results indicate that effective home care given to patients after cardiac surgery enables early detection of possible symptoms and complications, ensures continuity of care, increases self-efficacy, and reduces hospital readmissions.¹⁶⁻¹⁹

Following cardiac surgery, life-threatening complications may develop,²⁰ and morbidity has been reported to be highest in the first week after discharge, declining to its lowest level by 4 weeks.²¹ For this reason, postdischarge training, counseling, and home care services after cardiac surgery have been reported to play an important role in reducing problems after discharge.^{17,22,23} Ozen and Sevig found that planned discharge programs and home visits

ABSTRACT

OBJECTIVES: Home care that maintains continuity of health care services after cardiac surgery is considered a complementary component of clinical care. We estimated that effective home care given with a multidisciplinary approach would contribute to decreasing symptoms and readmissions to the hospital after cardiac surgery.

STUDY DESIGN: This experimental study with a 6-week follow-up period and a 2-group repeated measures design with pretest, posttest, and interval tests was conducted in a public hospital in Turkey in 2016.

METHODS: We identified the self-efficacy levels, symptoms, and readmissions to the hospital of 60 patients (30 in the experimental group and 30 in the control group) throughout the data collection process, and we estimated the effect of home care on self-efficacy, symptom management, and hospital readmissions by comparing the data of patients in the experimental and control groups. Each patient in the experimental group received 7 home visits along with 24/7 telephone counseling services throughout the first 6 weeks after discharge, and patients were provided physical care, training, and counseling services during these home visits with the collaboration of their physician.

RESULTS: Home care resulted in better self-efficacy and fewer symptoms in the experimental group ($P < .05$), and it also reduced readmissions to the hospital in the experimental group (23.3%) compared with the control group (46.7%).

CONCLUSIONS: This study's findings suggest that home care, with a focus on continuity of care, decreases symptoms and readmissions to the hospital and improves the self-efficacy of patients after cardiac surgery.

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made to patients after coronary artery bypass grafting were effective in managing postoperative care and in preventing complications and unplanned hospital readmissions.²² In a study conducted by Nabagiez et al, home visits were found to be a cost-effective strategy to reduce readmissions following cardiac surgery.¹⁹ In the literature, however, relatively few studies have evaluated the effect of home care on self-efficacy, symptom management, and hospital readmissions after cardiac surgery.

Our current study differs from other studies in terms of using the power of a multidisciplinary approach, especially between the physician and the home care nurse, and this approach has been used to ensure symptom management and to reduce hospital readmissions. We also used technology (a messaging app) when the home care nurse contacted the physician to provide better care and treatment to the patients and to promote cost-effectiveness. Therefore, we primarily aimed to determine the effects of home care given with a multidisciplinary approach on self-efficacy, symptom management, and hospital readmissions. Secondarily, we estimate that the findings of this study will be beneficial for home health care professionals working in this field and will contribute to planning health care services with the collaboration of physicians after cardiac surgery.

METHODS

Study Setting and Data

This experimental study with a 2-group repeated measures design with pretest, posttest, and interval tests was conducted in a Turkish province between January 2015 and June 2016. We included patients 30 years or older who underwent cardiac surgery at a public hospital. The sample size of the study was determined by power analysis. It was determined that the minimum sample size for each group should be at least 25 patients at an α significance level of .05 and 95% CI to reach 80% power; however, 30 patients were selected for each group to compensate for the expected 20% dropout rate during the 6-week follow-up period. After the study was conducted, post hoc power analysis was performed to determine the adequacy of the sample size of the study. In the power analysis, intragroup comparisons of the experimental group were used for the self-efficacy variable. As a result of the analysis, it was determined that the effect size of the study was 0.807 at a significance level of .05 and at a 95% CI, and its power was 0.99. These values indicate that the sample is sufficient.²⁴

A total of 72 patients underwent cardiac surgery throughout the study period; 4 were residing outside the provincial center, so they were excluded from the study. Of the 68 patients who met the inclusion criteria, 61 agreed to participate in the study. Within the follow-up period, 1 patient in the control group died from sepsis; therefore, 30 patients in the experimental group and 30 patients

TAKEAWAY POINTS

Home care after cardiac surgery plays a key role in decreasing symptoms and readmissions to the hospital and increasing self-efficacy, which in turn ensure cost-effective delivery of health care services.

- ▶ Effective home care after cardiac surgery should be given to patients for successful symptom management, which is key to decreasing readmissions and increasing patients' self-efficacy.
- ▶ We believe that our results will contribute to planning and organizing cost-effective health care services because patients receiving home care and counseling with the aid of technology were admitted to the hospital less than half as often compared with the control group.

in the control group were included in the analysis because no patients wanted to leave the study and no other deaths occurred within the follow-up period. Patients were allocated to the groups (an experimental group and a control group) alternating by the order in which they were discharged.

Measurements

Data were collected in 3 ways: by using (1) a patient description form, (2) the Barnason Efficacy Expectation Scale (BEES): Cardiac Surgery Version, and (3) a symptom checklist.

Patient description form. This form includes 14 questions about the patient's sociodemographic attributes, such as age, gender, and education; 6 questions about disease-related characteristics; and 5 questions about the postoperative period.

BEES: Cardiac Surgery Version. This scale was developed by Barnason et al to determine self-efficacy during the recovery process after cardiac surgery.²⁵ The validity and reliability of this scale for use in Turkey were confirmed by Avci and Karahan.²⁶ The Cronbach α value for the scale was calculated as 0.93 in the study conducted by Barnason et al,²⁵ whereas it was determined to be 0.83 for all items in the validity and reliability study conducted by Avci and Karahan.²⁶

The Turkish version of the scale has 15 items in 5 subscales: physical functioning (3 items), self-care management (4 items), diet modification (2 items), psychosocial functioning (3 items), and exercise-activity modification (3 items). Each item is based on the patient's perception of their self-reliance about performing the behavior mentioned in the scale and is scored as 1 to 4 points on a Likert-type scale (1, strongly disagree; 4, strongly agree). The total score thus ranges from a minimum of 15 to a maximum of 60, and patients with higher scores would be expected to have greater efficacy in performing recovery and rehabilitation behaviors after cardiac surgery.²⁶

In this study, the Cronbach α value was found to be 0.97 for all items of the BEES. The Cronbach α values of the subscales were 0.88 for physical functioning, 0.96 for both self-care management and diet modification, 0.82 for psychosocial functioning, and 0.94 for exercise-activity modification.

Symptom checklist. The researchers (R.S.A. and D.K.) prepared a checklist of 10 symptoms frequently experienced after discharge, determined from the literature,^{4,6-9} including shortness of breath, palpitation, fever, edema in lower extremities, and sleep problems.

It was prepared as a visual analogue. Each symptom was scored between 0 and 10 points (0, no symptom; 10, very severe symptom), and the symptoms experienced by the patients were evaluated by mean score.

Data Collection

Each patient in the experimental group received 7 home visits: one in the first 24 to 48 hours after discharge and subsequent visits in the first, second, third, fourth, fifth, and sixth weeks post discharge. During these home visits, home care was provided in 2 stages: postdischarge training and physical care. Considering that the individuals in the experimental group might need guidance about some important issues, the researcher (R.S.A.) gave her telephone number to each patient in the experimental group and the patients were told that they could reach the researcher 24/7. Throughout the study, the researcher was telephoned 29 times by the experimental group patients and, if needed, the patients were directed to the appropriate physician/relevant institution. Patients in the control group received 5 home visits: one in the first 24 to 48 hours and subsequent visits in the second, fourth, sixth, and eighth weeks after discharge, and no intervention was carried out for the control group.

Pretest data. Patients who had undergone cardiac surgery were interviewed at the clinic before discharge, and individuals in both the experimental and control groups were given informed consent forms and were asked to read and sign the form if they agreed to participate in the study. During this interview, addresses and contact information of the patients were obtained. Pretest data were collected in the first 24 to 48 hours after discharge via home visit by using the patient description form, BEES, and symptom checklist.

Interval test data. To collect interval test data, home visits were made to patients in the experimental and control groups in the second, fourth, and sixth weeks following discharge, and the BEES and the symptom checklist were used for interval test data collection. Patients in the experimental and control groups were reminded in the sixth week after discharge that the last home visit would be made 2 weeks later.

Posttest data. Patients in the experimental and control groups were called before the eighth week and a suitable day was selected for both the patient and the researcher; then, posttest data were collected in the eighth week following discharge by using the BEES and the symptom checklist.

Home Care Interventions

Patients in the experimental group were provided with a training booklet prepared by the researcher (R.S.A.), which included information about symptom management and self-care after cardiac surgery. The home visits to patients in the experimental group were guided by this booklet, and issues were covered repeatedly if the researcher considered it necessary for the patient. A patient assessment form was prepared by the researcher for home visits and, in accordance with the information obtained from this form, patient needs were determined and home care interventions were

performed accordingly. To ensure symptom management, nursing care was provided, which included teaching patients wound care principles; ensuring the continuity of breathing exercises; teaching methods for coping with stress, anxiety, and pain; helping the patient to adapt to a healthy diet; etc. All findings from each home visit were recorded and when there were problems, the patient was provided appropriate treatment/care with the collaboration of their physician. The physician was contacted via voice call and messaging through a commonly used messaging application (WhatsApp) for every problem requiring a physician recommendation. For instance, when the home care nurse detected signs and symptoms of wound infection, she photographed the wound and sent the images (with the patient's permission) to the physician, and the physician recommended appropriate medical treatment, if necessary. Or, when a patient suffered from pain, the nurse performed the pain assessment with the aid of a visual analogue scale, contacted the physician, and made sure that an appropriate treatment was recommended. Home care interventions were multipurpose: to detect early signs and symptoms of possible complications, to reduce symptoms by increasing the self-efficacy of patients, to prevent hospital readmissions for each symptom, to protect the patient from possible traumas and nosocomial infections during the early recovery period, and to connect the patient with their physician in a timely manner, when necessary.

Data Analysis

SPSS for Windows 15.0 (IBM) was used to evaluate the data, and a P value less than .05 was accepted for the significance level of statistical analysis. For the presentation of the data, means, SDs, and percentages were used. In addition, the χ^2 test was used to detect whether there was a significant relationship between the variables, the Fisher exact χ^2 test was used when the expected value was less than 5 in 2×2 tables, the t test in independent groups was used to compare the means of 2 independent groups, and the Friedman test was used to determine differences between groups when the dependent variable being measured was ordinal.

Ethics Committee Approval

Before carrying out the research, approval was obtained from the Ethics Committee of Ataturk University Faculty of Health Sciences (January 14, 2015).

RESULTS

Homogeneity Test in Demographic and Disease-Related Characteristics

The mean (SD) age of the patients in the experimental group was 64.03 (9.60) years; 52.9% were women, 50.9% were married, and 52.9% had completed at least high school. The mean (SD) age of the patients in the control group was 64.77 (12.64) years; 51.2% were men, 66.7% were single, and 62.5% were graduates of secondary school, which provides secondary education for children aged 11 to 14 years

TABLE 1. Comparison of the Descriptive Characteristics of Patients in the Experimental and Control Groups

Characteristics	Experimental group		Control group		Test and significance
	n	Row %	n	Row %	
Gender					$\chi^2=0.082^a$ $P=.774$
Female	9	52.9	8	47.1	
Male	21	48.8	22	51.2	
Marital status					$P>.99^b$
Married	29	50.9	28	49.1	
Single	1	33.3	2	66.7	
Education status					$\chi^2=0.606^a$ $P=.895$
Illiterate	7	50.0	7	50.0	
Primary school (aged 7-11 years)	11	52.4	10	47.6	
Secondary school (aged 11-14 years)	3	37.5	5	62.5	
High school (aged 14-18 years) and above	9	52.9	8	47.1	
Profession					$\chi^2=0.269^a$ $P=.874$
Homemaker	7	46.7	8	53.3	
Employed	6	46.2	7	53.8	
Retired	17	53.1	15	46.9	
Family type					$\chi^2=0.098^a$ $P=.754$
Nuclear	24	51.1	23	48.9	
Extended	6	46.2	7	53.8	
Patient caregiver					$\chi^2=0.759^a$ $P=.684$
Spouse	19	48.7	20	51.3	
Daughter-in-law	4	66.7	2	33.3	
Daughter or son	7	46.7	8	53.3	
Economic status according to expenses					$\chi^2=1.119^a$ $P=.571$
Less than expenses	4	40.0	6	60.0	
Equal to expenses	18	48.6	19	51.4	
More than expenses	8	61.5	5	38.5	
Age, mean (SD)	64.03 (9.60)		64.77 (12.64)		$t=-0.253^c$ $P=.801$
Body mass index, mean (SD)	28.69 (4.45)		28.04 (3.64)		$t=0.626^c$ $P=.534$

^aChi-square test.
^bFisher exact χ^2 test.
^ct test in independent groups.

TABLE 2. Comparison of Medical Histories and Postoperative Characteristics of Patients in the Experimental and Control Groups

Characteristics	Experimental group		Control group		Test and significance
	n	Row %	n	Row %	
Having any surgery before					$\chi^2=0.268^a$ $P=.605$
Yes	17	53.1	15	46.9	
No	13	46.4	15	53.6	
Presence of ≥ 1 chronic disease					$\chi^2=0.067^a$ $P=.796$
Yes	15	51.7	14	48.3	
No	15	48.4	16	51.6	
Chronic disease					$\chi^2=4.704^a$ $P=.582$
Diabetes	7	66.7	4	33.3	
Hypertension	10	46.7	11	53.3	
Asthma	1	25.0	2	75.0	
Medicine use					$\chi^2=0.341^a$ $P=.559$
Yes	21	47.7	23	52.3	
No	9	56.3	7	43.8	
Smoking					$\chi^2=0.000^a$ $P>.99$
Yes	8	50.0	8	50.0	
No	22	50.0	22	50.0	
Surgery type					$P>.99^b$
CABG	27	50.0	27	50.0	
Valve surgery	3	50.0	3	50.0	
Hospital stay after the operation					$\chi^2=4.305^a$ $P=.366$
5-6 days	7	53.8	6	46.2	
7-10 days	17	48.6	18	51.4	
11-15 days	2	40.0	3	60.0	
16-20 days	1	25.0	3	75.0	
21-25 days	3	100	0	0.0	
Heart disease duration in years, mean (SD)	4.37 (3.89)		4.30 (6.43)		$t=0.049^c$ $P=.961$
Number of vessels replaced, mean (SD)	2.27 (1.26)		2.43 (1.28)		$t=0.509^c$ $P=.603$

CABG, coronary artery bypass graft.
^aChi-square test.
^bFisher exact χ^2 test.
^ct test in independent groups.

in the Turkish education system (Table 1). When characteristics and medical history of patients were examined, it was determined that the differences between groups were not statistically significant ($P > .05$) and that the 2 groups were similar (Table 1 and Table 2).

Effect of Home Care on Self-efficacy, Symptom Management, and Hospital Readmissions

Intragroup comparisons of the subscales and total score means of the BEES in the experimental and control groups are presented in

Table 3. There were statistically significant differences in the physical functioning, self-care management, diet modification, psychosocial functioning, and exercise-activity modification subscales and in the total mean scores of the BEES ($P < .05$). Regarding the pretest scores, it was determined that the mean score on the diet modification subscale was higher in the experimental group ($P < .05$), whereas there were no differences between the 2 groups in terms of other subscales and total mean scores of the BEES ($P > .05$). At the first home visit, the mean scores of the self-care management and diet

TABLE 3. Intragroup Comparison of Mean Scores of the Patients in the Experimental and Control Groups Regarding BEES Subscales and Total Score Means

BEES subscales and total score						
Group	Pretest	Visit 1	Visit 2	Visit 3	Post test	Test* and significance
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
Physical functioning						
Experimental	3.00 (0.00)	3.57 (1.10)	5.43 (1.91)	6.67 (1.99)	11.27 (2.79)	$\chi^2_F = 107.027$ $P < .001^*$
Control	3.00 (0.00)	3.67 (0.89)	4.43 (1.38)	5.90 (1.27)	9.03 (1.90)	$\chi^2_F = 106.992$ $P < .001^*$
Self-care management						
Experimental	7.33 (2.95)	10.60 (2.81)	12.43 (2.40)	12.43 (2.40)	14.23 (1.99)	$\chi^2_F = 69.189$ $P < .001^*$
Control	6.87 (1.74)	7.60 (2.61)	8.87 (2.71)	8.87 (2.71)	9.70 (2.63)	$\chi^2_F = 47.023$ $P < .001^*$
Diet modification						
Experimental	5.07 (1.55)	5.53 (1.14)	6.60 (0.93)	6.60 (0.93)	7.00 (1.02)	$\chi^2_F = 62.796$ $P < .001^*$
Control	4.30 (0.95)	4.37 (1.30)	5.70 (5.91)	5.70 (5.91)	4.87 (1.28)	$\chi^2_F = 13.607$ $P = .009^*$
Psychosocial functioning						
Experimental	5.17 (1.18)	5.03 (1.03)	6.67 (1.49)	6.67 (1.49)	8.73 (2.02)	$\chi^2_F = 94.928$ $P < .001^*$
Control	4.70 (1.02)	5.07 (1.14)	6.07 (1.28)	6.07 (1.28)	6.93 (1.53)	$\chi^2_F = 71.896$ $P < .001^*$
Exercise-activity modification						
Experimental	6.17 (2.23)	7.70 (1.74)	9.47 (1.33)	9.47 (1.33)	10.60 (1.48)	$\chi^2_F = 91.487$ $P < .001^*$
Control	5.50 (1.36)	6.13 (1.98)	6.67 (2.01)	6.67 (2.01)	7.07 (1.74)	$\chi^2_F = 38.125$ $P < .001^*$
Total score						
Experimental	26.73 (7.12)	32.43 (5.82)	40.60 (6.49)	44.93 (7.31)	48.80 (7.84)	$\chi^2_F = 101.49$ $P < .001^*$
Control	24.37 (3.99)	26.53 (6.22)	31.73 (9.70)	33.30 (6.87)	35.13 (7.45)	$\chi^2_F = 93.119$ $P < .001^*$

BEES, Barnason Efficacy Expectation Scale.

* $P < .05$.

* χ^2_F is the Friedman test.

and exercise-activity modification subscales and total mean scores of the BEES were found to be higher in the experimental group ($P < .05$), whereas there were no statistically significant differences in the physical and psychosocial functioning subscales of the BEES between the 2 groups ($P > .05$). At the second home visit, the mean scores of the physical functioning, self-care management, and diet and exercise-activity modification subscales and total mean scores were higher in the experimental group ($P < .05$), whereas the difference between the 2 groups was not statistically significant in the psychosocial functioning subscale of the BEES ($P > .05$). At the third home visit, the mean scores of the self-care management and diet and exercise-activity modification subscales and total mean scores were found to be higher in the experimental group ($P < .05$), whereas there were no differences in the physical and psychosocial

functioning subscales of the BEES ($P > .05$). Regarding the posttest mean scores of the BEES, the mean scores of the subscales and total mean scores were higher in the experimental group ($P < .05$) (Table 3).

Symptoms experienced by the patients in the experimental and control groups are presented in Table 4. There were statistically significant differences in the intragroup comparisons performed for both groups in terms of shortness of breath, palpitation, fever, edema in lower extremities, fatigue and weakness, sleep and appetite problems, pain, discharge from the surgical area, and constipation symptoms ($P < .05$). When the pretest mean scores of each symptom experienced during the follow-up period were compared between the 2 groups, the scores for all symptoms were similar ($P > .05$). At the first home visit, it was found that shortness of breath, edema in lower extremities, fatigue and weakness, and pain symptoms were experienced more in the control group ($P < .05$). At the second home visit, shortness of breath, palpitation, edema in lower extremities, fatigue and weakness, and pain symptoms were experienced more in the control group ($P < .05$), whereas the difference between the 2 groups was not significant in terms of other symptoms ($P > .05$). At the third home visit, shortness of breath, palpitation, edema in lower extremities, fatigue and weakness, sleep and appetite problems, and pain symptoms were found to be experienced more in the control group ($P < .05$). Regarding the posttest mean scores, shortness of breath, palpitation, edema in lower extremities, fatigue and weakness, appetite problems, and pain symptoms were experienced more in the control group ($P < .05$),

whereas the difference was not statistically significant in terms of other symptoms ($P > .05$) (Table 4).

In this study, 46.6% of patients in the control group were readmitted to the hospital for various reasons (23.3% infection/discharge from the incision area, 16.6% dehiscence in the sternum, and 6.7% shortness of breath) during the postdischarge follow-up period, and the readmission rate was halved in the experimental group (23.3%) (Table 5).

DISCUSSION

In this study carried out to investigate the effect of home-based cardiac rehabilitation on self-efficacy, the self-efficacy of patients increased in both groups toward the eighth week after discharge post

cardiac surgery, but self-efficacy improvement in the experimental group was higher at the end of the eighth week. Home-based cardiac rehabilitation had a positive effect on patients' self-efficacy.²⁷ Results of a study by Gohari et al showed that cardiac rehabilitation and telephone follow-up increased the self-efficacy of patients after cardiac surgery.²⁸ Additionally, Varaei et al found that education after cardiac surgery had a positive impact on patients' self-efficacy.¹⁶ Isik and Karaoz further determined that discharge training and counseling services positively affected patients' care behaviors, decreased the problems experienced after discharge, and increased self-efficacy.²⁹ Our findings, similar to those of these previous studies, indicate that effective home care and successful symptom management have a positive impact on self-efficacy after cardiac surgery. We attribute these results to the fact that the multidisciplinary approach, a major strength of this study, was adopted and used, with the fundamental contribution of the app technology. We believe that when this approach is adopted—that is, when physician/nurse collaboration is strengthened to ensure continuation of care and medical treatment—patient outcomes in all aspects may be greatly improved.

This study also revealed that although symptoms were decreasing in both groups toward the eighth week of discharge, symptoms of the patients in the experimental group decreased more quickly than among those in the control group. Patients in the control group experienced shortness of breath, palpitation, edema in lower extremities, fatigue/weakness, appetite problems, and pain more often than patients in the experimental group. It has been reported that rehabilitation after cardiac surgery contributes to recovery, reduces risk factors, and increases the physical capacity of patients.³⁰ Another study determined that motivating interviews performed by nurses help patients to take more responsibility for their own health to perform self-care activities and that such interviews reduce symptoms.³¹ Bikmoradi et al found that monitoring patients over the phone after cardiac surgery improved adherence to recommendations, resulting in fewer symptoms.³² Similarly, in this study, we believe that home care, successful symptom management, providing patients with guidance

TABLE 4. Intragroup Comparison of Mean Scores of the Patients in the Experimental and Control Groups Regarding the Symptoms Experienced After Discharge

Group	Symptoms					Post test	Test ^a and significance
	Pretest Mean (SD)	Visit 1 Mean (SD)	Visit 2 Mean (SD)	Visit 3 Mean (SD)			
Shortness of breath							
Experimental	5.07 (3.23)	2.83 (2.65)	1.03 (1.97)	0.50 (1.31)	0.20 (0.55)	$\chi^2_F = 97.014$ $P < .001^*$	
Control	5.23 (1.99)	5.53 (2.37)	4.00 (2.44)	2.90 (2.37)	2.47 (2.18)	$\chi^2_F = 68.954$ $P < .001^*$	
Palpitation							
Experimental	2.63 (2.74)	1.93 (2.46)	0.57 (1.52)	0.43 (1.77)	0.03 (0.18)	$\chi^2_F = 56.473$ $P < .001^*$	
Control	2.93 (2.26)	2.90 (2.56)	1.80 (2.31)	1.37 (2.03)	0.93 (1.55)	$\chi^2_F = 25.791$ $P < .001^*$	
Fever							
Experimental	0.37 (0.96)	0.60 (1.38)	0.00 (0.00)	0.03 (0.18)	0.00 (0.00)	$\chi^2_F = 13.901$ $P = .008^*$	
Control	1.07 (2.02)	1.53 (2.52)	0.57 (1.89)	0.40 (1.40)	0.20 (1.10)	$\chi^2_F = 19.353$ $P = .001^*$	
Edema in lower extremities							
Experimental	4.10 (2.09)	3.30 (2.07)	2.13 (1.78)	1.07 (1.26)	0.37 (0.61)	$\chi^2_F = 81.530$ $P < .001^*$	
Control	4.50 (1.93)	4.67 (2.19)	3.40 (2.08)	2.97 (2.16)	2.50 (2.03)	$\chi^2_F = 32.938$ $P < .001^*$	
Fatigue and weakness							
Experimental	3.97 (2.68)	3.57 (2.64)	1.73 (1.91)	1.00 (1.74)	0.27 (0.52)	$\chi^2_F = 78.080$ $P < .001^*$	
Control	4.93 (1.79)	4.87 (2.19)	3.90 (2.17)	2.50 (2.45)	1.80 (2.25)	$\chi^2_F = 47.230$ $P < .001^*$	
Sleep problems							
Experimental	5.23 (2.94)	4.80 (2.50)	3.30 (2.44)	0.47 (1.36)	1.30 (2.34)	$\chi^2_F = 75.258$ $P < .001^*$	
Control	5.97 (2.20)	5.63 (2.16)	4.00 (2.46)	1.90 (2.01)	2.33 (2.19)	$\chi^2_F = 49.297$ $P < .001^*$	
Appetite problems							
Experimental	2.00 (2.61)	1.67 (2.06)	1.20 (1.67)	0.47 (1.36)	0.03 (0.18)	$\chi^2_F = 42.970$ $P < .001^*$	
Control	3.13 (2.93)	3.03 (2.79)	1.83 (2.23)	1.90 (2.01)	1.27 (1.82)	$\chi^2_F = 4.897$ $P = .298$	
Pain							
Experimental	4.77 (2.49)	3.80 (2.07)	2.13 (2.08)	0.83 (1.15)	0.33 (0.55)	$\chi^2_F = 43.782$ $P < .001^*$	
Control	5.63 (1.69)	5.33 (2.20)	4.33 (1.63)	3.47 (2.03)	2.50 (2.06)	$\chi^2_F = 65.587$ $P < .001^*$	
Discharge from the surgical area							
Experimental	0.50 (1.25)	1.47 (2.57)	0.47 (1.48)	0.10 (0.55)	0.00 (0.00)	$\chi^2_F = 88.306$ $P < .001^*$	
Control	0.53 (1.50)	1.03 (2.47)	0.13 (0.43)	0.13 (0.73)	0.07 (0.37)	$\chi^2_F = 89.378$ $P < .001^*$	
Constipation							
Experimental	1.17 (1.86)	0.47 (0.94)	0.30 (1.15)	0.17 (0.65)	0.13 (0.73)	$\chi^2_F = 21.029$ $P < .001^*$	
Control	1.37 (2.44)	0.63 (1.71)	0.43 (1.30)	0.13 (0.73)	0.53 (1.41)	$\chi^2_F = 10.575$ $P = .032$	

* $P < .05$.

^a χ^2_F is the Friedman test.

TABLE 5. Hospital Readmissions in the Experimental and Control Groups

Reason for readmission	Experimental group (n = 30)		Control group (n = 30)	
	n	%	n	%
Infection/discharge from the incision site	3	10.00	7	23.33
Shortness of breath	2	6.67	2	6.67
Dehiscence in the sternum	1	3.33	5	16.67
Sleep disturbance due to fear of death	1	3.33	0	0.00
Total	7	23.33	14	46.67

in performing self-care activities, and 24/7 telephone guidance services to manage possible symptoms created this difference; therefore, patients in the experimental group experienced fewer symptoms compared with the control group.

Although lengths of hospital stays after cardiac surgery have decreased in recent years, hospital readmissions after discharge still pose a significant problem.^{19,21,33,34} It has been reported in the literature that home visits after discharge were effective in reducing readmissions to the hospital.^{17-19,22} In a study performed by Nabagiez et al in which patients were followed through home visits and over the phone after cardiac surgery, readmissions for infection and for some cardiac, pulmonary, and neurological problems were 25% lower in the experimental group than in the control group.³⁵ In a study conducted by Hall et al, results showed that home visits and telephone counseling to patients discharged after undergoing cardiac surgery reduced unplanned hospital readmissions.¹⁸ A study by Foley et al revealed that if patients undergoing heart surgery are provided with hospital-at-home programs, it may decrease hospital readmissions.¹⁷ Home visits after cardiac surgery have also been reported to be a cost-effective strategy to reduce readmissions following cardiac surgery.¹⁹ Similar to results of other studies, observations in this study showed that the number of hospital readmissions was lower in the experimental group compared with the control group. We think that 24/7 counseling services provided by the home care nurse had a great impact on this result because at the beginning of the study, patients in the experimental group were told that they should call the home care nurse before deciding to go to the hospital for any medical situation. Throughout the study, patients in the experimental group called the home care nurse for consultation on such issues as palpitations, fever, chest pain, shortness of breath, difficulty in removing secretions, signs of infection at the wound area, and sleep problems. The home care nurse first evaluated the patient on the phone and, in some cases, she was able to counsel the patient appropriately. If needed, she contacted the patient's physician, and if the physician considered it necessary, the patient was referred to the hospital, where they were treated. Unnecessary hospital readmissions were prevented because the home care nurse served as a bridge between the patient and the physician. Indeed, this study's findings indicate that effective home care given with a

multidisciplinary approach reduced readmissions to the hospital after cardiac surgery.

Limitations

This study's limitations include that it was performed at a single hospital, and there may be differences among hospitals in terms of discharge training and counseling services provided for patients after discharge.

CONCLUSIONS

Findings of this study indicate that effective home care for patients after cardiac surgery should involve a multidisciplinary approach because it contributes to decreases in clinical symptoms and in hospital readmissions. Based on our results, we suggest that patients and their families should routinely be given training booklets to be used in the hospital postoperatively and at home after discharge. To adopt a cost-effective strategy within the health care system, technology use, such as using applications for messaging and performing video calls whenever the patient needs help from a health care professional, should also be promoted for providing counseling services to these patients. In addition, costs of home care interventions may be calculated in further studies involving more patients and hospitals. ■

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REFERENCES

- Rajabi M, Safarpour G, Borzou SR, et al. Association between incidence of atrial fibrillation and duration of cardiopulmonary bypass in coronary artery bypass graft surgery (CABG): a cohort study. *Electron Physician*. 2018;10(4):6624-6630. doi:10.19082/6624
- Zilla P, Yacoub M, Zühlke L, et al. Global unmet needs in cardiac surgery. *Glob Heart*. 2018;13(4):293-303. doi:10.1016/j.gheart.2018.08.002
- Myles PS. Meaningful outcome measures in cardiac surgery. *J Extra Corpor Technol*. 2014;46(1):23-27.
- Direk F, Celik SS. Postoperative problems experienced by patients undergoing coronary artery bypass graft surgery and their self-care ability after discharge. *Turk Gogus Kalp Damar Cerrahi Derg*. 2012;20(3):530-535. doi:10.5606/tgkdc.dergisi.2012.101
- Care of patients with coronary artery disease and cardiac surgery. In: Stromberg HK. *Medical-Surgical Nursing: Concepts and Practice*. 5th ed. Elsevier; 2021:461-480.
- Ammouri AA, Al-Daakak ZM, Isac C, Gharaibeh H, Al-Zaru I. Symptoms experienced by Jordanian men and women after coronary artery bypass graft surgery. *Dimens Crit Care Nurs*. 2016;35(3):125-132. doi:10.1097/DCC.0000000000000175
- Oshvandi K, Pakrad F, Mohamadi Saleh R, Seif Rabiee MA, Shams A. Post-operative symptoms and complications in patients having undergone coronary artery bypass graft in Hamadan: a descriptive cross-sectional study. *Jundishapur J Chronic Dis Care*. 2020;9(4):e104180. doi:10.5812/jjcdc.104180

8. Tuna Z, Celik SS. Discharge training and counseling: functional autonomy and post-discharge problems of elderly patients undergoing coronary artery bypass graft surgery. *Turk Gogus Kalp Damar Cerrahisi Derg.* 2014;22(3):570-576. doi:10.5606/tgkdc.dergisi.2014.9623
9. Bozkurt T, Saglam R. Symptoms and care satisfaction in patients who underwent coronary artery bypass graft surgery. *Clin Exp Health Sci.* 2021;11(3):481-486. doi:10.33808/clinexphealthsci.817535
10. Bandura A. Self-efficacy: toward a unifying theory of behavior change. *Psychol Rev.* 1977;84(2):191-215. doi:10.1037//0033-295x.84.2.191
11. Zulkosky K. Self-efficacy: a concept analysis. *Nurs Forum.* 2009;44(2):93-102. doi:10.1111/j.1744-6198.2009.00132.x
12. Lai YH, Hsieh SR, Ho WC, Chiou AF. Factors associated with sexual quality of life in patients before and after coronary artery bypass grafting surgery. *J Cardiovasc Nurs.* 2011;26(6):487-496. doi:10.1097/JCN.0b013e3182050269
13. Sarkar U, Ali S, Whooley MA. Self-efficacy as a marker of cardiac function and predictor of heart failure hospitalization and mortality in patients with stable coronary heart disease: findings from the Heart and Soul Study. *Health Psychol.* 2009;28(2):166-173. doi:10.1037/a0013146
14. Maeda U, Shen BJ, Schwarz ER, Farrell KA, Mallon S. Self-efficacy mediates the associations of social support and depression with treatment adherence in heart failure patients. *Int J Behav Med.* 2013;20(1):88-96. doi:10.1007/s12529-011-9215-0
15. Robertson SM, Huddleston C, Porter B, Ampoker AB, Evans-Hudnall GL. Self-care self-efficacy, religious participation and depression as predictors of poststroke self-care among underserved ethnic minorities. *Health Psychol Res.* 2013;1(1):e13. doi:10.4082/hpr.2013.e13
16. Varaei S, Shamsizadeh M, Cheraghi MA, Talebi M, Dehghani A, Abbasi A. Effects of a peer education on cardiac self-efficacy and readmissions in patients undergoing coronary artery bypass graft surgery: a randomized-controlled trial. *Nurs Crit Care.* 2017;22(1):19-28. doi:10.1111/nicc.12118
17. Foley OW, Ferris TG, Thompson RW, et al. Potential impact of hospital at home on postoperative readmissions. *Am J Manag Care.* 2021;27(12):e420-e425. doi:10.27765/ajmc.2021.88797
18. Hall MH, Esposito RA, Pekmezaris R, et al. Cardiac surgery nurse practitioner home visits prevent coronary artery bypass graft readmissions. *Ann Thorac Surg.* 2014;97(5):1488-1493. doi:10.1016/j.athoracsur.2013.12.049
19. Nabagiez JP, Shariff MA, Molloy WJ, Demissie S, McGinn JT Jr. Cost analysis of physician assistant home visit program to reduce readmissions after cardiac surgery. *Ann Thorac Surg.* 2016;102(3):696-702. doi:10.1016/j.athoracsur.2016.03.077
20. Mali S, Haghaninejad H. Pulmonary complications following cardiac surgery. *Arch Med Sci Atheroscler Dis.* 2019;4:e280-e285. doi:10.5114/amsad.2019.91432
21. Ngaage DL, Gooseman MR, Bulliment KL, et al. Is six weeks too long for the first outpatient review after cardiac surgery? FORCAST6. *Br J Cardiol.* 2019;26:34. doi:10.5837/bjc.2019.008
22. Ozen B, Sevig EU. The impact of planned hospital discharge program on complications and hospital readmissions in patients undergoing coronary artery bypass grafting. *Turk Gogus Kalp Damar Cerrahisi Derg.* 2017;25(3):353-362. doi:10.5606/tgkdc.dergisi.2017.13940
23. Akbari M, Celik SS. The effects of discharge training and counseling on post-discharge problems in patients undergoing coronary artery bypass graft surgery. *Iran J Nurs Midwifery Res.* 2015;20(4):442-449. doi:10.4103/1735-9066.161007
24. Capik C. Statistical power analysis and its use in nursing research: basic information. Article in Turkish. *Anatol J Nurs Health Sci.* 2014;17(4):268-274.
25. Barnason S, Zimmerman L, Atwood J, Nieveen J, Schmaderer M. Development of a self-efficacy instrument for coronary artery bypass graft patients. *J Nurs Meas.* 2002;10(2):123-133. doi:10.1891/jnum.10.2.123.52553
26. Avci S, Karahan A. The reliability and validity of Barnason efficacy expectation scale cardiac surgery version for Turkey. *Turk Gogus Kalp Damar Cerrahisi Derg.* 2013;21(3):691-698. doi:10.5606/tgkdc.dergisi.2013.7520
27. Poortaghi S, Baghernia A, Golzari SE, Safayian A, Atri SB. The effect of home-based cardiac rehabilitation program on self-efficacy of patients referred to cardiac rehabilitation center. *BMC Res Notes.* 2013;6:287. doi:10.1186/1756-0500-6-287
28. Gohari F, Hasanvand S, Gholami M, Heidari H, Baharvand P. Effectiveness of rehabilitation by telephone follow-up on the self-efficacy of patients undergoing coronary artery bypass graft surgery. *Interdiscip J Acute Care.* 2020;1(2):66-73. doi:10.22087/ijac.2020.127194
29. Isik SA, Karaos S. Effects of discharge training and counseling service on self-efficacy, care behaviors and the problems experienced in patients who have undergone coronary artery by-pass graft surgery: an experimental study. *Turk Clin J Nurs Sci.* 2022;14(3):627-637. doi:10.5336/nurses.2021-86250
30. Scatvini S, Zanelli E, Comini L, et al. Home-based versus in-hospital cardiac rehabilitation after cardiac surgery: a nonrandomized controlled study. *Phys Ther.* 2013;93(8):1073-1083. doi:10.2522/ptj.20120212
31. Creber RM, Patey M, Lee CS, Kuan A, Jurgens C, Riegel B. Motivational interviewing to improve self-care for patients with chronic heart failure: MITI-HF randomized controlled trial. *Patient Educ Couns.* 2016;99(2):256-264. doi:10.1016/j.pec.2015.08.031
32. Bikmoradi A, Masmouei B, Ghomseini M, Roshanaei G. Impact of tele-nursing on adherence to treatment plan in discharged patients after coronary artery bypass surgery: a quasi-experimental study in Iran. *Int J Med Inform.* 2016;86:43-48. doi:10.1016/j.ijmedinf.2015.12.001
33. Fox JP, Suter LG, Wang K, Wang Y, Krumholz HM, Ross JS. Hospital-based, acute care use among patients within 30 days of discharge after coronary artery bypass surgery. *Ann Thorac Surg.* 2013;96(1):96-104. doi:10.1016/j.athoracsur.2013.03.091
34. Glans M, Kragh Ekstam A, Jakobsson U, Bondesson Å, Midlöv P. Risk factors for hospital readmission in older adults within 30 days of discharge – a comparative retrospective study. *BMC Geriatr.* 2020;20:467. doi:10.1186/s12877-020-01867-3
35. Nabagiez JP, Shariff MA, Khan MA, Molloy WJ, McGinn JT Jr. Physician assistant home visit program to reduce hospital readmissions. *J Thorac Cardiovasc Surg.* 2013;145(1):225-231, 233; discussion 232-233. doi:10.1016/j.jtcvs.2012.09.047

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