

The impact of planned hospital discharge program on complications and hospital readmissions in patients undergoing coronary artery bypass grafting

Planlı hastane taburculuk programının koroner arter baypas greftleme yapılan hastalarda komplikasyonlar ve hastane geri dönüşleri üzerine etkisi

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ABSTRACT

Background: This study aims to investigate the impact of planned hospital discharge program (discharge training, phone consulting, and home visiting) on complications of patients undergoing coronary artery bypass grafting and on their return to hospital.

Methods: In this randomized-controlled, single-blind study, randomization was done based on three variables: age, gender, and education status. In total, 60 patients were included and were randomly divided into control and intervention groups as 30 patients in each group. Discharge program was applied to the intervention group. The patients were evaluated with home visits.

Results: Almost all of the intervention group patients had normal physical examination findings such as systolic and diastolic blood pressure, pulse, body temperature, bowel sounds, edema, use of triflow and lung sounds, and they experienced no complications such as persistent pain, despite resting and sublingual pills, palpitation with shortness of breath, persistent shortness of breath despite resting, increased body weight of more than 1 to 1.5 kg per day, body temperature more than 38.0 °C and inflammatory flow, flushing and swell in incision area. Unintended return back to the hospital in the intervention group was prevented in 54 of 59 patients and was requested for five patients. In the control group, 22 patients returned back to the hospital for the first time and five for the second time.

Conclusion: Our study results demonstrate that planned discharge program applied on patients with coronary artery bypass grafting is effective in the management of postoperative care and preventing complications and unintended returns back to the hospital.

Keywords: Consultation with phone; coronary artery bypass grafting; discharge education; home visit.

ÖZ

Amaç: Bu çalışmada, koroner arter baypas greftleme yapılan hastalarda planlı hastane taburculuk programının (taburculuk eğitimi, telefon danışmanlığı ve ev ziyareti) komplikasyonlar ve hastaneye geri dönüş üzerine etkisi araştırıldı.

Çalışma planı: Bu randomize kontrollü, tek kör çalışmada randomizasyon yaş, cinsiyet ve eğitim durumu olmak üzere, üç değişkene göre yapıldı. Çalışmaya toplam 60 hasta alındı ve her grupta 30'ar hasta olacak şekilde kontrol ve girişim olmak üzere rastgele gruplara ayrıldı. Taburculuk programı girişim grubuna uygulandı. Hastalar ev ziyaretinde değerlendirildi.

Bulgular: Deney grubu hastaların tamamına yakınında sistolik ve diyastolik kan basıncı, nabız, vücut ısısı, bağırsak sesleri, ödem, triflow kullanımı ve akciğer sesleri gibi fizik muayene bulguları normaldi ve istirahat ve dil altı hapa rağmen geçmeyen ağrı, nefes darlığı ile birlikte olan çarpıntı, istirahat ile geçmeyen nefes darlığı, günde 1-1.5 kg'dan fazla kilo artışı, 38.0 °C dereceyi geçen vücut ısısı ve insizyon bölgesinde iltihaplı akıntı, kızarma, şişme gibi komplikasyonlar gözlenmedi. Girişim grubunda 59 hastanın 54'ünde hastaneye plansız geri dönüş engellendi ve beş hastanın hastaneye geri dönüşü istendi. Kontrol grubundaki 22 hasta bir kez, beş hasta ise iki kez hastaneye plansız geri dönüş yaptı.

Sonuç: Çalışma sonuçlarımız, koroner arter baypas greftleme yapılan hastalara uygulanan planlı taburculuk programının ameliyat sonrası bakımının sağlanmasında ve komplikasyonların ile hastaneye plansız geri dönüşlerin önlenmesinde etkili olduğunu göstermektedir.

Anahtar sözcükler: Telefonla danışmanlık; koroner arter baypas greftleme; taburculuk eğitimi; ev ziyareti.



Available online at
www.tgkdc.dergisi.org
doi: 10.5606/tgkdc.dergisi.2017.13940
QR (Quick Response) Code

Received: September 30, 2016 Accepted: February 13, 2017

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Heart and vascular diseases are ranked as the first among major life-threatening diseases worldwide and in Turkey, despite the protection and prevention studies, developments in surgery, and diagnostic and therapeutic methods.^[1,2]

Coronary artery bypass grafting (CABG) is currently the most commonly used open surgery method for the surgical treatment of heart diseases.^[3] The problems emerge after the discharge period for patients having CABG and for their relatives. Discharged patients may experience some problems at home such as opening of stitches, pain, immobility, constipation, irregular nutrition, stress, and maladjustment. These problems usually appear within the first six weeks following surgery.^[3,4] After discharge, all possible problems cause stress for both patients and their families. Most patients and their families need help for solutions of the problems at home.^[5,6] Discharge planning and healthcare at home are the main components of care sustainability and health improvement services. Discharge training is one of the important parts of discharge planning. Discharge training is an important step to determine patient's care needs at home, to increase the quality of patient care, and to provide the sustainability of care. Apart from discharge training, phone consulting is one of the most common nursery approaches to ease the healing at home following surgery.^[7-12]

Previous studies have shown that discharge training, nursery care, and home-based care have improved the patient's quality of life, by improving his mental and physical health and adaptive response to home and treatment.^[13,14] Moreover, these interventions result in the engagement of the patient and his family to the treatment process, thereby, increasing the use of health services after discharge with increased patient's satisfaction. It is well-known that patients having training and consulting have easier transition from hospital to home with reduced care and treatment costs.^[15,16]

A nurse should do planning by informing and involving patient, his family, and team members after collecting necessary data. The quality of nursery care and the ability of patient's self-care after discharge reflect the surgery success and it has an important role in preventing complications.^[6,17-19]

This study is done to search about the influence of discharge program (discharge training, phone consulting, home visit) on complications and return to hospital of patients having CABG.

PATIENTS AND METHODS

This randomized-controlled, single-blind study was conducted at cardiovascular surgery service (CVS) and CVS intensive care unit of a hospital. Patients who underwent CABG stayed at hospital approximately for six or seven days and they were discharged.

In the study sampling, randomization was done based on three variables: age, gender, and education status (Table 1). According to this randomization, 30 patients were assigned for control and study groups, in total 60 patients (Figure 1). Six patients were excluded from study for each control and study groups. The study was completed with 48 patients (Figure 1). The patients were not informed about their assigned group. The effect size was found power to be 100%, depending on type 1 error 0.05. Study sampling was completed between January and August 2011. Data were collected by the researcher with Patient Details Form, Form for Risk Factors Related with Coronary Artery Disease and Surgery/Hospital Life of the Patients, Monitorization Form of Consulting with Phone, Form for Characteristics Related with Unintended Application to Hospital, and Control Form of Home Visit.

Inclusion criteria: Patients who decided to undergo CABG at the hospital where research took place, signed the informed consent form, were communicable, were educated enough to read and write in Turkish, and had two or less chronic diseases were included in the study.

Exclusion criteria: Patients with walking disability preventing exercising and patients who developed complications during the hospitalization period were excluded from the study.

An ethical approval was obtained from Acibadem University Medical Studies Ethics Commission (2010/73) and hospital management before starting the study. A written and oral consent was obtained from each patient. The study was conducted in accordance with the principles of the Declaration of Helsinki.

After taking permission from the intervention group, the data were collected based on the procedure. Later planned discharge program was applied. Discharge training was composed of three steps. These were planned discharge training at the hospital, phone consulting, and home visit (Figure 2).

It was planned with cooperation of patient and his family starting from the day entering the hospital till the discharge day for two to three times daily. Trainings were given at patient's room for 15 min by following diagnostics, planning, application, and

Table 1. Demographic characteristics

Characteristics	Intervention group (n=24)		Control group (n=24)		p*
	n	%	n	%	
Age (year)					0.680
46-49	1	4.2	1	4.2	
50-59	12	50.0	8	33.3	
60-75	11	45.8	15	62.5	
Gender					1.000
Female	4	16.7	5	20.8	
Male	20	83.3	19	79.2	
Marital status					1.000
Married	22	91.7	22	91.7	
Unmarried	2	8.3	2	8.3	
Education status					0.573
Literate	7	29.2	4	16.7	
Primary	8	33.3	11	45.8	
High school	9	37.5	8	33.3	
College	0	0.0	1	4.2	
Employment status					0.740
Employed	7	29.2	5	20.8	
Unemployed	17	70.8	19	79.2	
Education status of companion					0.846
Illiterate	5	20.8	4	16.7	
Literate	6	25.0	8	33.3	
Primary school	8	33.4	9	37.5	
High school	5	20.8	3	12.5	

* Chi-square test was applied.

evaluation processes. The booklet named as “Life and Precautions at Home After CABG”, prepared with the help of specialists’ views, was given to patient and his family at the start of the training. This booklet includes information about the hospital processes of patients having CABG, things should be done and not to be done during care at hospital and home, nutrition, exercise, emergency cases, the cases when to call nurse. Trainings which were given to patient and his family by nurse were recorded to the “Patient Training Form” including the information about the training subject, date and time.

All patients were requested to call the researcher, when they needed to obtain information during the hospital stay or after discharge, and when they experienced anxiety or emergency cases.

The researcher listened to the patient’s concern, applied necessary nursery attempt, directed patient to appropriate person and institution and took feedback from patient about his last condition by calling. After each call, the details were recorded to the “Phone Consulting Follow-Up Form”. The patient’s pain was assessed with Visual Analog Pain Score (VAS). The

business card which includes researcher’s contact details was given to patient and his family to facilitate the communication.

Home visit was done after 25 to 30 days of discharge with the availability of both patient and researcher. The “Home Visit Control Form” was used during home visit. During home visit, it was checked whether the patient and his family applied the trainings given at the hospital, if not, then the reasons were questioned, and necessary nursery care was applied and physical examination was performed.

The patients with normal physical health results who applied the given trainings were supported by the researcher. Caregivers were appreciated and encouraged. For the patients who did not apply trainings and suggestions or whose physical health results were abnormal were identified. Then, the reasons were questioned and nursery attempts were applied in the frame of nursery procedures. In case of any complications or emergency cases, other institutions or specialists (doctor, CVS responsible nurse, dietician, pharmacist, physiotherapist and psychologist) were called and cooperated.

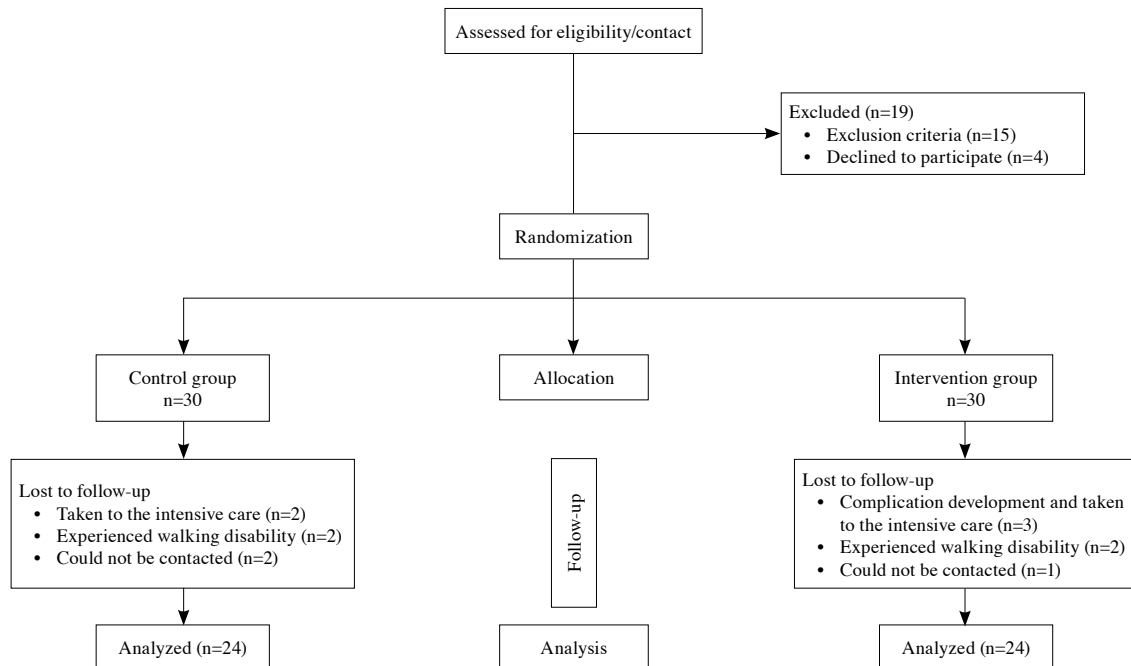


Figure 1. Anticipated participant flow through study.

Data were collected based on the data collection procedure after taking permission from patients in the control group (Figure 2). Planned discharge program was not applied to this group. All patients in the control group received the standard care. Home visit was done after 25 to 30 days of discharge with the availability of both patient and researcher to check the patient's condition. The "Home Visit Control Form" was used to question the patient's practice, and physical examination was performed.

Statistical analysis

Statistical analysis was performed using the SPSS version 15.0 software (SPSS Inc., Chicago, IL, USA). The exact chi-square test and McNemar's test were used. $P < 0.05$ was accepted as statistically significant. Descriptive data were expressed in number and percentage and in mean and standard deviation (SD).

RESULTS

The mean of age of the intervention group was 59.7 ± 7.9 years and 63.8 ± 7.7 years in the control group ($p > 0.05$). Male patients formed 83.3% and 79.2% of the intervention and control groups, respectively (Table 1). A total of 45.8% of the patients both in the intervention and control groups had coronary artery disease for 13 to 120 months. For the patients in the intervention group 20.8% were smokers, 29.2% were physically active, and 29.1% had normal body mass

index (BMI). The same parameters in the control group were 33.3%, 33.3%, 25.0%, respectively. One patient in the intervention group and two patients in the control group who stayed for 11 to 15 days in the hospital stayed longer due to cardiac rhythm problems (Table 2) ($p > 0.05$).

All patients were questioned about proper or improper applications during home visits. Most of the patients in the intervention group did right applications properly with planned discharge training regarding breathing exercises, varicose vein sock usage, quitting smoking, excretion, bath and wound care, nutritional choices, exercise, resting and free time usage, sexual life, coping with stress, adapting to home and attending to control visit, whereas most of the patients in control group did improper applications ($p < 0.001$). Based on the physical examination results during home visits (Table 3), it was observed that most of patients in the intervention group had normal systolic blood pressure, diastolic blood pressure, pulse, body temperature, bowel sounds, edema, wound place at sternum, triflow usage, and lung sounds, whereas the patients in the control group had abnormal physical examination findings ($p < 0.001$). In addition, the patients in the intervention group had improved BMI values, whereas the patients in the control group had reduced BMI values. According to the complications following surgery (Table 4), almost all patients except one in the intervention group had

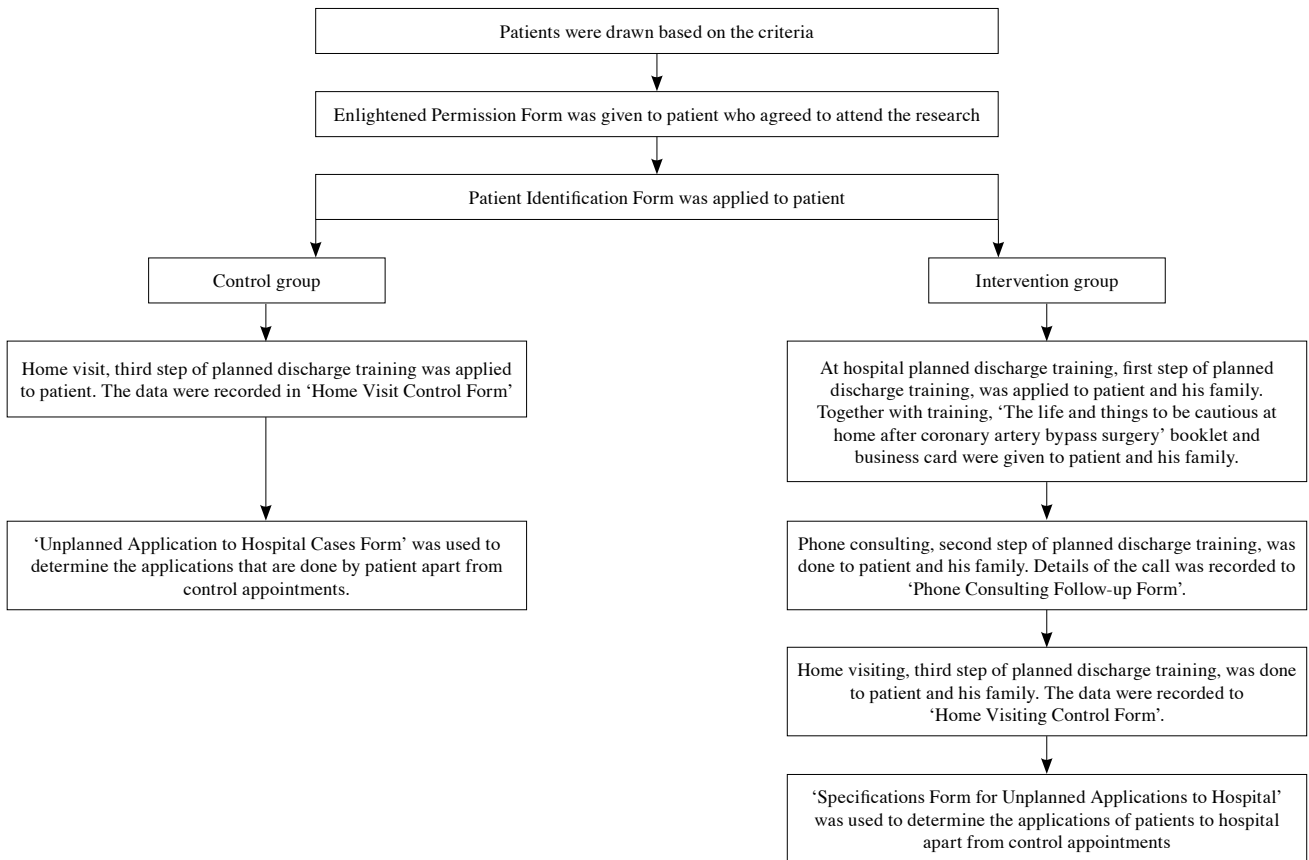


Figure 2. Data collection procedures.

no complications such as pain, despite sublingual medication use, tachycardia together with dyspnea, dyspnea despite having rest, more than 1 to 1.5 kg weight gain daily, body temperature above 38 °C, weeping at the incision region, whereas most of the patients in the control group had these complications ($p < 0.001$).

In addition, the patients in the intervention with applied phone consulting called the researcher about problems such as mostly pain, edema, breath problems, fear, stress, sleep disorder, constipation, control appointment, protection of sternum, bathing and wound care, and emergency cases. The patients who called due to pain had a mean pain score of 7 ± 1.0 before the intervention, according to the Visual Analog Pain Score (VAS) and it decreased to 2.8 ± 1.1 after the intervention. The researcher was called for 59 times by the patients in the intervention group. During phone call depending on the patient and his family's complaint, nursery intervention was done and multidisciplinary cooperation was conducted. After the intervention, the results were taken and recorded.

A total of 49 patients that had phone consulting reported that their complaints resolved. Other five patients reported that they had less complaints and five patients were requested to return to the hospital. The patients mostly called the researcher intensively during the first and sixth weeks. The nurse prevented the return of 54 patients of 59 by phone consulting the patient and his family. When unintended return of the patients in the control group to hospital was observed, 22 returns were made and the patients stayed with the mean of 1.9 ± 1.4 days at hospital. Three patients in the intervention group made unintended return to the hospital and stayed a mean of 1.5 days (Table 5).

DISCUSSION

In the present study, we showed that discharge training after CABG and home visit were effective in the control of systolic blood pressure and quitting smoking.^[16,20,21] In this study, all patients in the intervention group quit smoking, whereas all smokers in the control group failed. Based on the physical examination findings, the patients in the intervention group had highly

Table 2. Clinical characteristics

Health specifications	Intervention group (n=24)		Control group (n=24)		p*
	n	%	n	%	
Duration of coronary artery disease					0.576
<3 months	8	33.4	5	20.9	
4-12 months	5	20.8	8	33.3	
13-120 months	11	45.8	11	45.8	
Chronic disease					1.000
None	8	33.3	8	33.3	
Diabetes mellitus	5	20.9	2	8.3	
Hypertension	8	33.3	11	45.9	
Diabetes mellitus and hypertension	3	12.5	3	12.5	
Alcohol					0.609
Users	3	12.5	1	4.2	
Non-users	21	87.5	23	95.8	
Smoking					0.443
Users	5	20.8	8	33.3	
Non-users	10	41.7	6	25.0	
Used to	9	37.5	10	41.7	
Exercise					1.000
Yes	7	29.2	8	33.3	
No	17	70.8	16	66.7	
Body mass index					0.513
Normal	7	29.1	6	25.0	
Not too fat	10	41.7	15	62.5	
First degree fat	3	12.5	2	8.3	
Second degree fat	4	16.7	1	4.2	
Duration of hospital stay					0.700
6 days	3	12.5	1	4.2	
7-10 days	20	83.3	21	87.5	
11-15 days	1	4.2	2	8.3	

* Chi-square test was applied.

normal systolic and diastolic blood pressure, breath count, effective trifold use, and lung sounds, whereas the control group (70 to 91%) had abnormal values. Recent studies have also shown that smoking increases atherosclerosis and thrombosis in bypassed and non-bypassed veins, and it promotes the complications after surgery. In addition, maintaining smoking after surgery increase the mortality rates by two-folds due to the increase in blood pressure.^[22-25] Similarly, in this study, 65% of the patients in the intervention group who quitted smoking had normal levels of diastolic and systolic blood pressure, whereas 70% of patients in the control group did not have normal levels of diastolic and systolic blood pressure. Each 10 mmHg increase in systolic blood pressure cause 22.5% elevation in surgery risk, and the control group who were not trained and had abnormal blood pressure values had the risk of complication development and re-surgery.^[23,26] In the present study, the risk of

complication development decreased significantly in the intervention group who were trained.

Previous studies also demonstrated that discharge training after surgery affected patients positively regarding adaptive response to diet, increase in physical activity, weight gain control, regular exercising, and regular bowel movement.^[6,16,27-29] Similarly, in this study, we found that the patients in the intervention group applied the training rules regarding, nutrition choice after surgery, not having constipation, and exercise; however, the control group did not. In particular, 70.8% of patients in intervention group have not done any exercise ever, after surgery 91.7% of the patients in the intervention group started to do exercise regularly. A total of 66.7% of the patients in the control group had not done exercise ever, which increased to 79.2% after surgery (p<0.001). In addition, the intervention group had imposed BMI values, whereas the values worsened in the control group.

Table 3. Physical examination findings

Physical examination	Intervention group (n=24)				Control group (n=24)				p*
	Normal		Abnormal		Normal		Abnormal		
	n	%	n	%	n	%	n	%	
Systolic blood pressure	15	62.5	9	37.5	7	29.2	17	70.8	0.041
Diastolic blood pressure	16	66.7	8	33.3	7	29.2	17	70.8	0.020
Pulse	24	100.0	0	0	19	79.2	5	20.8	0.050
Fever	24	100.0	0	0	19	79.2	5	20.8	0.050
Bowel sound	22	91.7	2	8.3	4	16.7	20	83.3	<0.001
Edema	18	75.0	6	25.0	0	0	24	100.0	<0.001
Wound place at sternum	24	100.0	0	0	9	37.5	15	62.5	<0.001
Triflow usage	21	87.5	3	12.5	2	8.3	22	91.7	<0.001
Lung sound	21	87.5	3	12.5	4	16.7	20	83.3	<0.001

* Chi-square test was applied.

Table 4. Emergency cases and complications

Complications	Intervention group (n=24)				Control group (n=24)				p*
	Symptom (+)		Symptom (-)		Symptom (+)		Symptom (-)		
	n	%	n	%	n	%	n	%	
Pain	0	0.0	24	100.0	19	79.2	5	20.8	<0.001
Tachycardia	1	4.2	23	95.8	15	62.5	9	37.5	<0.001
Breath shortage	0	0.0	24	100.0	7	29.2	17	70.8	0.009
Sudden weight increase	0	0.0	24	100.0	20	83.3	4	16.7	<0.001
Sudden change in vision	0	0.0	24	100.0	2	8.3	22	91.7	0.489
Fainting feeling	1	4.2	23	95.8	6	25.0	18	75.0	0.097
Body temperature over 38 °C	1	4.2	23	95.8	12	50.0	12	50	0.001
Efflux at incision region	0	0.0	24	100.0	18	75.0	6	25.0	<0.001

* Chi-square test was applied.

Nutrition and exercise are critical for the patients' health after CABG. Balanced and efficient nutrition result in normal values of blood pressure, blood fatty acid levels, wound healing, normal BMI values, and bowel sounds for patients after surgery. Furthermore, regular exercise increases basal metabolism, decreases myocardial oxygen need for daily activities, and causes psychosocial healing.^[24,25] Exercise has been also suggested as an important treatment step in preventing sudden cardiac death.^[24,25,30,31] Based on our study results, trainings given in nutrition, exercise, resting, and wound healing decreased the complication risk in the patients in the intervention group, supporting the H1 hypothesis.

Furthermore, correct use of varicose veins sock regulates blood circulation and decreases edema in legs and thromboembolism development risk.^[27,32-34] In this study, the intervention group had no edema in legs due to trainings given about varicose vein sock

use, whereas the control group had such problems (p<0.001). Strikingly, edema development in legs results in thromboembolism, which may cause sudden death after surgery.^[3,9] This implies that the patients in the control group may have complications, thereby, returning hospital and may have sudden death.

In the present study, discharge training and home visits were effective and the patients applied these trainings accordingly. These trainings were given prior to the surgery until discharge on daily basis and structured based on adult training specifications, involved both patient and his family in care, cooperated with health team, personalized trainings were given, patient's motivation and physical situation were cared, and patient and his family were consulted by phone.^[6,19,35-39]

Pain despite having sublingual pill, palpitation with dyspnea, dyspnea despite having rest, more than 1 to 1.5 kg weight gain daily, body temperature

Table 5. Unintended return to hospital and its reasons distribution

Problems causing unplanned return	Intervention group				Control group				
	1 st Application		2 nd Application		1 st Application		2 nd Application		
	n	Mean±SD	n	Mean±SD	n	Mean±SD	n	Mean±SD	
Chest pain	0		0		3		2		
Infection at vein removed incision region	0		0		3		1		
Breathe problem	1		0		3		0		
Bleeding at sternum incision	1		0		3		0		
Infection at sternum incision	0		0		3		0		
Insomnia	0		0		3		1		
Constipation	0		0		2		0		
Benumbed feeling on left arm	0		0		1		0		
Fainting	1		0		1		0		
Edema	0		0		0		1		
Total patient number	3		0		22		5		
Average of hospital stay/days (min-max)	1.6±1.2 days (1-3)		-		1.9±1.4 days (1-5)		1		0-1

SD: Standard deviation.

over 38 °C, and inflammation at the incision region were significantly lower in the intervention group, compared to the control group (p<0.001). This study also showed that combining discharge training with phone consulting eased adaptation of patients after surgery and due to proper self-care complication development risk decreased. Complications were observed in the control group due to the lack of trainings; therefore, they returned hospital, supporting the H1 and H2 hypotheses. It is also known that these complications prolonged the healing process and constrained patient and his family financially. Moreover, apart from causing physical pain for the patient, complications resulted in necrophobia, being asocial, not be able to undertake responsibilities at home, thereby, affecting patient's psychology adversely. When unintended return to the hospital was investigated, three patients in the intervention group and 22 patients in the control group returned to the hospital at the first attempt, while only five patients in the control group returned to the hospital at the second attempt.

The patients in the control group were admitted to hospital mostly due to chest pain, infection at incision region due to vein removal, breath problem, bleeding and infection at sternum incision region, and insomnia and stayed at hospital for a mean of 1.9 days. Nurses did phone consultation with the patients in the intervention group and the patients were invited to the hospital, if needed. After intervention, five patients were requested to return to the hospital. Responding and consulting to 54 calls resulted in decrease of patient's complains and relieved them. Therefore, unintended return to hospital was less among the patients in the intervention group, supporting the H2 hypothesis. Unintended return to the hospital and complication development caused increase in the costs regarding medicine use and bed occupation.^[18,22] In this study, planned discharge program applied to the patient and his family reduced the complication development and unintended return to the hospital; therefore, the costs could be reduced. Thus, discharge training together with phone consultation and home visits decreased the complications thanks to the care control after surgery, multidisciplinary cooperation, early intervention, motivating patient and his family, facilitating patient adaptation to home, and personalized care at home, thereby, preventing unintended returns to the hospital.

In conclusion, planned discharge program which was composed of discharge training, phone consultation, and home visits provided patients who underwent

coronary artery bypass grafting the following benefits in the postoperative period:

- Proper breathing, quitting smoking, regular exercising, adaptation to diet, proper usage of varicose vein sock, effective bathing and wound care, easy adaptation to home
- Normalized physical examination results
- Decreased complications due to proper management of self-care
- Reduced unintended return to hospital

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

This study is funded by Erciyes University Scientific Research Projects Unit (BAP) through a Project (TSD-10-3276).

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