



Post-Operative Symptoms and Complications in Patients Having Undergone Coronary Artery Bypass Graft in Hamadan: A Descriptive Cross-Sectional Study

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Received 2020 April 29; Revised 2020 September 22; Accepted 2020 October 09.

Abstract

Background: Coronary artery bypass graft surgery is one of the common treatments for cardiac diseases, despite the numerous complications of CABG.

Objectives: This study was carried out to investigate post-operative complications and symptoms in patients undergoing coronary artery bypass graft.

Methods: This descriptive cross-sectional study was conducted on 170 patients who were referred to Farshchian heart Center in Hamadan in 2018. The data were collected using a demographic questionnaire and a standard checklist for the assessment of cardiac symptoms. All patients completed the demographic information questionnaire, and patients' contact information was recorded. One month after the discharge, the cardiac symptom questionnaire was completed through the phone interview with the participants. Data were analyzed by the SPSS software version 21. Descriptive statistics, Chi-square, and regression were used for data analysis.

Results: Of 170 patients, 130 cases were male, and 70% were under the age of 60 years old. The most common symptom after surgery was leg swelling (40.6%), and the least common complication was a fluttering chest (3.5%). There was a significant relationship between age and chest pain ($P = 0.01$), smoking and dyspnea ($P = 0.032$), troubles of sleeping ($P = 0.044$), and leg swelling ($P = 0.035$), depression and gender ($P < 0.001$), BMI and poor appetite ($P = 0.042$).

Conclusions: It is important to consider the symptoms and complications of CABG in these patients. Leg swelling, trouble of sleeping, and fatigue were common symptoms in these patients. It is suggested that appropriate training is provided to patients, particularly smoking cessation.

Keywords: Coronary Artery Bypass Graft Surgery, Complications, Heart Disease

1. Background

Coronary artery disease (CAD) has been known as the leading cause of death worldwide. According to the World Health Organization (WHO), CAD-induced mortality is on the top of the death list, with 7.4 million deaths each year in the world (1, 2). It is estimated that 16.7 million deaths from heart disease in 2002 would reach 23.3 million in 2030 (3). According to the WHO (2016), 45% of deaths in Iran are due to cardiovascular disease (4). Although about three-quarters of these deaths occur in low- and middle-income countries, Iran has one of the highest age-standardized

prevalence rates of CVD (> 9000 cases per 100 000 people) (5).

Coronary artery bypass grafting reduces the mortality rate in people with coronary artery disease (6). Coronary Artery Bypass Grafting (CABG) is one of the major treatments for CAD (7). CABG results in 5-year survival of over 85% and 10-year survival of about 70%. It also leads to relief and improvement of cardiac angina for 10 - 15 years and reduces the risk of heart attack (8). Usually, this method is used when the left coronary artery or all three major coronary arteries are involved, especially the upper left coronary artery (9). This treatment relieves chest

pain, improves the tolerance of exercise, increases survival, and promotes quality of life. Therefore, it is important to manage risk factors after the treatment to prevent cardiac symptoms and coronary artery stenosis. Nearly one million CABGs are performed in the world each year (1, 3, 10).

Patients undergoing CABG are more likely to experience various symptoms. Chest pain or angina pectoris has been reported as the most common symptom before CABG (11). Cardiovascular transplantation has some complications, including death, myocardial infarction, or respiratory infection, and stress. Prevention of these complications is essential in these patients (12, 13). Previous studies have shown a significant number of symptoms in patients undergoing CABG, including dyspnea, anxiety, depression, poor appetite, leg swelling, arrhythmia, trouble of sleeping, incision pain, fatigue, and angina (1, 3). These symptoms interfere with patients' daily activities, sleep, and well-being. If these symptoms persist, delayed wound healing and death risk increase (1).

Most studies conducted on patients undergoing CABG have investigated the mortality rate. Few studies have been conducted on the symptoms experienced by patients, while these patients often experience multiple symptoms after heart surgery. Although symptoms usually decrease over time, they may remain for months after discharge (3).

The first month following the CABG is very stressful. In many studies, lack of support and inadequate information has been reported in these patients (14). Patients may experience stress and experience feelings such as vulnerability, anxiety, and dependence after the operation. Although patients should be involved in home care, most of them suffer from anxiety and depression, which can reduce their functional status leading to an increase in mortality and post-operative complications. (15). Furthermore, it has been shown that 75% of patients undergoing a CABG experience post-discharge problems in the first 14 days after the surgery (3).

2. Objectives

Because there is no accurate information about the consequences and complications after surgery in patients undergoing coronary artery bypass graft surgery in Hamedan, there are also a few articles on this subject to examine these signs and symptoms more prominently.

By identifying these factors, this research can help nurses and physicians to provide training during and after discharge to provide more effective training to patients. On the other hand, by receiving the right training, the chances of re-hospitalization can be reduced. Since there is less information about symptoms and complications of

CABG, this study aimed to examine post-operative symptoms and complications of CABG in patients undergoing this treatment. Nurses have an important role in educating patients about symptoms and complications of CABG; therefore, they can be trained properly before, during, and after CABG to detect these symptoms.

3. Methods

This descriptive cross-sectional study was conducted in Farshchian heart center, affiliated with Hamadan University of Medical Sciences, in the west of Iran, in 2018. The Ethics Committee of the Hamadan University of Medical Sciences approved this study (IR.UMSHA.REC.1396.470). Patients were selected by convenience sampling. The list of patients at the time of discharge was taken daily from the inpatient ward. After examining the patients, they entered the study based on the input and output criteria, and this process continued until the desired sample size was reached. A written consent form was obtained from people who were a candidate for CABG. The sample size was calculated using the same article (1), taking into account $p = 0.56$, and 95% confidence level, and 10% drop out rate, the sample size was calculated 170 (Figure 1).

The inclusion criteria were: (a) age over 18; (b) CABG surgery for the first time; (c) ability to communicate verbally; (d) access by telephone for follow-up; (e) no history of mental disorders. Patients with any of the following were excluded from the trial: (a) CABG with other heart surgeries; (b) patient dissatisfaction, and (c) no drug addiction.

Data collection tools consisted of a demographic information questionnaire developed by the researchers and the cardiac symptom survey. The demographic questionnaire consisted of two parts: participants' characteristics including gender, age, level of education, occupational status, height and weight, history of smoking, and chronic conditions such as hypertension, renal failure, diabetes, and hyperlipidemia, which were completed by the staff before the patient was discharged. The second part of the questionnaire included medical information that was completed from the patient's record during hospitalization or after contact by phone and complications after the discharge.

The cardiac symptom survey was used to examine symptoms experienced by patients. This questionnaire contains 10 symptoms after CABG, including angina, shortness of breath, fatigue, depression, trouble of sleeping, pain (incision), swelling in legs, and fluttering feeling in the chest, anxiety, and poor appetite. This checklist has acceptable reliability and validity so that the percent agree-

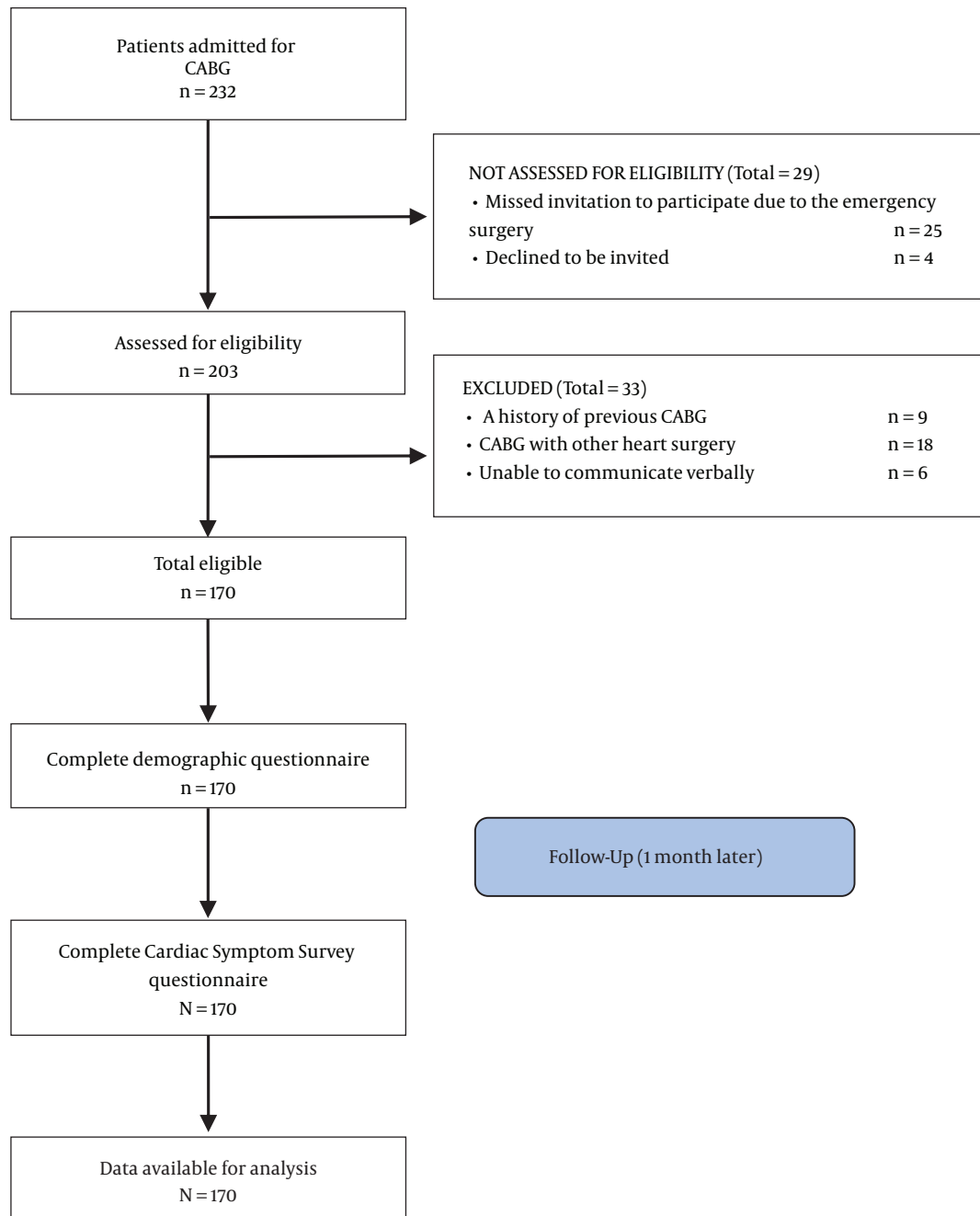


Figure 1. study flow chart

ment and content validity coefficient ranges from 0.99 to 1.00 and Cronbach's alpha from 0.85 to 0.98 (1).

The routine education was provided to all patients by the trained nurses at the time of discharge. The demographic information questionnaire was completed, in which patients' contact information was recorded. One

month after discharge from the hospital, the researcher contacted the patients, and the cardiac symptoms questionnaire was completed.

The SPSS 21 software was used for data analysis. Demographics and other variables were analyzed by descriptive statistics, including mean, standard deviation, frequency,

and percentage. Chi-square, logistic regression, Poisson, and linear regression were used to examine the relationship between symptoms of CABG and demographic variables.

4. Results

As shown in Table 1, most participants were males (76.5%), under 60 years old (82.35%), illiterate (86.5%), unemployed (77.7%), urban residents (81.2%), non-smokers (60%), overweight (42.4%), and hypertensive (41.8%) (Table 1).

Table 1. Demographic Data of Patients Undergoing CABG

Variable	No. (%)	Mean (SD)	Range
Sex			
Male	130 (76.5)		
Female	40 (23.5)		
Age			
> 60 y	59 (17.65)	68.67 (6.4)	61 - 86
≤ 60 y	111 (82.35)	52.25 (6.1)	32 - 60
Education Status			
Illiterate	147 (86.5)		
Educated	23 (13.5)		
Working Status			
Unemployed	132 (77.7)		
Employed	38 (22.4)		
Residency			
City	138 (81.2)		
Village	32 (18.8)		
Cigarette smoking			
No	102 (60.0)		
Yes	68 (40.0)		
Body mass index, kg/m²			
Underweight	5 (2.9)	17.3 (0.4)	16.4 - 17.7
Normal	62 (36.5)	22.9 (1.7)	18.8 - 25.0
Overweight	72 (42.4)	27.0 (1.3)	25.0 - 29.7
Obese	31 (18.2)	32.3 (2.0)	30.0 - 37.1
Chronic diseases			
None	51 (30.0)		
Hypertension	71 (41.8)		
Diabetes	48 (28.2)		
Hyperlipidaemia	19 (11.2)		
Others	13 (7.6)		

The most common complication of coronary artery bypass graft surgery was leg swelling (40.6%), and the least one was chest pain (3.5%). In terms of other complications, the most common complication was constipation (28.2%).

There was a significant relationship between chest pain and age ($P = 0.010$), smoking and shortness of breath ($P = 0.032$), depression and gender ($P < 0.001$), smoking, and trouble sleeping ($P = 0.044$), and smoking and leg swelling ($P = 0.035$). Patients over 60 years experienced more pain; smokers had more shortness of breath, more trouble sleeping, and more edema; women experienced more depression. There was a significant relationship between BMI and appetite ($P = 0.042$), so that underweight-subjects had a poor appetite (Table 2).

With an increase of age for each year, the probability of chest pain was as high as 1.05 times ($P = 0.026$). The logistic regression test showed that the ratio for shortness of breath in smokers was 3.35 times higher than non-smokers ($P = 0.010$). In addition, the rate of depression in women is 0.254 times more than that in men ($P = 0.011$). With the increase of the age for each year, the rate of the swelling in the legs was 0.47 times higher ($P = 0.010$) (Table 3).

The logistic regression test showed that with each year's increase in age, the mean of chest pain intensity increased by 0.02 ($P = 0.047$). In smokers, the severity of the shortness of breath was higher at 0.439 ($P = 0.009$). Also, the severity of depression in men was less than that of women ($P = 0.002$) (Table 4).

5. Discussion

Coronary artery bypass graft (CABG) has been used to treat coronary artery disease for a long time. CABG has shown long-lasting benefits compared to angioplasty. Surgical techniques have been standardized since the 1960s, post-operative protocols have been improved, and effective post-operative care has been developed (16). However, coronary artery disease is the leading cause of death and illness in the world. At a macroeconomic level, cardiovascular disease imposes a heavy burden on economies in low and middle-income countries (17).

In this study, most participants were men, under the age of 60, illiterate, unemployed, urban residents, non-smokers, overweight, and hypertensive patients. The most common complication of coronary artery bypass graft surgery was leg swelling. The least common complication was fluttering in the chest. The most common symptom was constipation. There was a significant relationship between chest pain and age, such that people over 60 years experienced more pain.

There was also a significant relationship between smoking and dyspnea, depression and gender, smoking,

Table 2. Relationship Between Demographic Factors and Post-Operative Symptoms in Patients Undergoing CABG Surgery

	Sex		Age		Cigarette Smoking		BMI			
	Male	Female	≤ 60	> 60	Smoking	Non-Smoking	Underweight	Normal	Overweight	Obese
Angina (Chest pain)										
Yes	19.2 (25)	27.5 (11)	10.2 (6)	27.0 (30)	14.7 (10)	25.5 (26)	40.0 (2)	22.6 (14)	23.6 (17)	9.7 (3)
No	80.8 (105)	72.5 (29)	89.8 (53)	73.0 (81)	85.3 (58)	74.5 (76)	60/0 (3)	77.4 (48)	76.4 (55)	90.3 (28)
P value	0.263		0.010		0.092		0.279			
Dyspnea										
Yes	18.5 (24)	30.0 (12)	18.6 (11)	22.5 (25)	29.4 (20)	15.7 (16)	40.0 (2)	12.9 (8)	27.8 (20)	19.4 (6)
No	81.5 (106)	70.0 (28)	81.4 (48)	77.5 (86)	70.6 (48)	84.3 (86)	60.0 (3)	87.1 (54)	72.2 (52)	80.6 (25)
P value	0.118		0.556		0.032		0.136			
Depression										
Yes	9.2 (12)	30.0 (12)	11.9 (7)	15.3 (17)	10.3 (7)	16.7 (17)	20.0 (1)	9.7 (6)	18.1 (13)	12.9 (4)
No	90.8 (118)	70.0 (28)	88.1 (52)	84.7 (94)	89.7 (61)	83.3 (85)	80.0 (4)	90.3 (56)	81.9 (59)	87.1 (27)
P value	0.001		0.538		0.242		0.550			
Swelling in legs										
Yes	36.9 (48)	52.5 (21)	30.5 (18)	45.9 (51)	30.9 (21)	47.1 (48)	40.0 (2)	30.6 (19)	50.0 (36)	38.7 (12)
No	63.1 (82)	47.5 (19)	69.5 (41)	54.1 (60)	69.1 (47)	52.9 (54)	60.0 (3)	69.4 (43)	50.0 (36)	61.3 (19)
P value	0.079		0.051		0.035		0.156			
Trouble sleeping										
Yes	27.7 (36)	15.0 (6)	27.1 (16)	23.4 (26)	32.4 (22)	19.6 (20)	20.0 (1)	29.0 (18)	23.6 (17)	19.4 (6)
No	72.3 (94)	85.0 (34)	72.9 (43)	76.6 (85)	67.6 (46)	80.4 (82)	80.0 (4)	71.0 (44)	76.4 (55)	80.6 (25)
P value	0.104		0.595		0.044		0.751			
Poor appetite										
Yes	6.9 (9)	10.0 (4)	3.4 (2)	9.9 (11)	8.8 (6)	6.9 (7)	40.0 (2)	4.8 (3)	8.3 (6)	6.5 (2)
No	93.1 (121)	90.0 (36)	96.6 (57)	90.1 (100)	91.2 (95)	93.1 (95)	60.0 (3)	95.2 (59)	91.7 (66)	93.5 (29)
P value	0.522		0.128		0.637		0.042			

and trouble sleeping, as well as smoking and leg swelling. Smokers had more breathlessness, more trouble sleeping, and more leg swelling. Women experienced more depression. There was a significant relationship between BMI and appetite, so that the underweight subjects had a poor appetite.

Feng et al. (2018) investigated the rate of re-hospitalization and its risk factors in a retrospective cohort study. The results indicate that most problems are atrial fibrillation (26.7%), pleural effusion (22.5%), and wound infection (17.7%) (18), which seem different from the results of the present study.

Trouble in sleeping due to respiratory problems after CABG was reported to be common at approximately 50%. Furthermore, dyspnea occurs in association with supraventricular arrhythmias, such as atrial fibrillation after CABG (19). In this study, trouble sleeping was a common symptom after CABG.

Normally, nursing care focuses on improving post-operative care in patients undergoing CABG. However, reducing the length of stay in the hospital means that enough information is hardly provided to support home improvement during hospital admission. Problems that occur commonly in patients undergoing CABG after dis-

charge include chest pain and leg ulcers, poor appetite, fatigue, trouble sleeping, and wound problems (20). Gallagher et al. (2004) examined the problems of women after CABG in the discharge phase. The results showed that most problems during the first and third weeks include trouble sleeping, poor appetite, nausea, and pain in the incision area on the chest. Although these problems recovered during the first six weeks, nearly one-quarter of women reported chest pain, and nearly 40% had problems with leg swelling and foot ulcers (20). In this study, trouble with sleeping and leg swelling were common complications after CABG.

Savage and Grap in a study examined problems experienced after cardiac arrhythmia in patients during the first two weeks after discharge. The most commonly reported problems were leg swelling (48%), appetite problems (35%), nausea (35%), dyspnea (29%), fatigue and slowness (21%), sleep disorders (12%), and ulcer drainage (9%). Also, the problems associated with pain were not surprisingly common (21). In another study, 44% of patients reported incisional pain in the first week, and 96% in the next three weeks (22). In this study, the most frequent complication was also leg swelling, which is consistent with the results of this study.

Table 3. Relationship Between Demographic Factors and Chest Pain Using Logistic Regression Test

	Sex (Male)	Age (y)	Cigarette Smoking	BMI			
				Underweight (Reference)	Normal	Overweight	Obese
Angina (chest pain)							
B (SE)	0.314 (0.497)	0.049 (0.022)	-0.617 (0.459)	-	-1.282 (1.029)	-1.187 (1.027)	-2.272 (1.165)
P value	0.528	0.026	0.179	-	0.213	0.248	0.051
OR (CI %)	0.731 (0.276 - 1.936)	1.050 (1.006 - 1.096)	0.540 (0.219 - 1.327)	-	0.278 (0.037 - 2.085)	0.305 (0.041 - 2.284)	0.103 (0.011 - 1.012)
Dyspnea							
B (SE)	-0.991 (0.515)	0.003 (0.020)	1.158 (0.452)	-	-1.161 (1.017)	-0.451 (0.995)	-1.010 (1.059)
P value	0.054	0.888	0.010	-	0.254	0.650	0.340
OR (CI %)	0.371 (0.135 - 1.018)	1.003 (0.963 - 1.044)	3.185 (1.312 - 7.730)	-	0.313 (0.043 - 2.299)	0.637 (0.091 - 4.473)	0.364 (0.046 - 2.905)
Depression							
B (SE)	-1.408 (0.554)	-0.003 (0.024)	0.139 (0.542)	-	-1.053 (1.224)	0.853 (1.211)	-1.202 (1.287)
P value	0.011	0.912	0.798	-	0.390	0.481	0.350
OR (CI %)	0.245 (0.083 - 0.724)	0.997 (0.951 - 1.046)	0.870 (0.301 - 2.519)	-	0.349 (0.032 - 3.845)	0.426 (0.040 - 4.577)	0.301 (0.024 - 3.743)
Swelling in legs							
B (SE)	0.038 (0.424)	0.046 (0.018)	-0.657 (0.367)	-	0.825 (1.004)	0.156 (0.994)	-0.304 (1.034)
P value	0.928	0.010	0.074	-	0.411	0.875	0.769
OR (CI %)	0.962 (0.419 - 2.209)	1.047 (1.011 - 1.84)	0.518 (0.252 - 1.065)	-	0.438 (0.061 - 3.132)	1.169 (0.167 - 8.198)	0.738 (0.097 - 5.603)

Table 4. Relationship Between Demographic Factors and Severity of Chest Pain Using Linear Regression Test

Demographic Variable	Angina (Chest Pain)		Dyspnea		Depression	
	B (SE)	P Value	B (SE)	P Value	B (SE)	P Value
Sex (Male)	-0.237 (0.252)	0.349	0.336 (0.199)	0.093	-0.519 (0.161)	0.002
Age (y)	0.020 (0.010)	0.047	-0.003 (0.008)	0.739	-0.001 (0.006)	0.831
Body mass index	-0.038 (0.025)	0.138	0.020 (0.020)	0.331	0.008 (0.016)	0.629
Smoking	-0.171 (0.210)	0.418	0.439 (0.166)	0.009	0.012 (0.135)	0.927

Hosseiniyan et al. (2013) investigated the early complications of coronary artery bypass graft in the first month after surgery. The results showed that the most common complication among these patients is cardiovascular complications, especially cardiac dysrhythmias. Hence, these patients require more cardiac support (23). Ammouri et al. (2016) reported that 65% of patients complained of chest pain, which was the most common symptom experienced by them. Leg swelling 60%, heartbeat sensation 15%, angina 8%, and depression 3% were reported by participants. Symptoms of poor appetite, troubles of sleeping, and fatigue were found to have a significant relationship with demographic variables.

In a mixed-method study, Lie (2012) examined the ex-

periences of patients with symptoms and needs in the initial phase of post-coronary artery bypass graft rehabilitation. The results of the study showed that patients had pain, acute sensitivity, problems with exercise and physical activity, medication, troubles of sleeping, irritability, post-operative complications, problems with returning to work, and inadequate information during discharge (12). In the present study, those symptoms were also present, but trouble of sleeping was more common than in other cases.

This study is one of the few studies that focus on the severity and types of symptoms after heart surgery, unlike other articles that deal with the mortality of these patients.

The results of this study direct nurses and other health

care providers to anticipate the symptoms experienced by post-CABG patients. Furthermore, they guide nurses and health professionals working in cardiothoracic units to improve their knowledge base on the causation of these symptoms and their management strategies. In addition, this study guides nurses to preoperatively prepare patients to expect these symptoms and teach them strategies to prevent or alleviate them, keeping in mind their backgrounds.

The limitation of the study included the use of client self-reported symptoms and post-operative problems. Therefore completing the questionnaire may be influenced by factors such as boredom, fatigue, and being influenced by the opinions of other family members. In this study, only patients who underwent coronary artery bypass grafting were assessed. It is suggested that in future studies, patients be examined after a variety of cardiac surgeries, including heart valve surgery.

In conclusion, the results showed that patients undergoing CABG suffer from multiple problems after discharge. More education is required due to the fact that hospitalization is short. Common symptoms in these patients were leg swelling, constipation, and trouble sleeping. Therefore, appropriate strategies should be considered for prevention even before the surgery, and the patients are encouraged not to smoke.

Acknowledgments

We would like to appreciate the Vice-chancellor of Research and Technology of Hamadan University of Medical Sciences (No. 9607254674) for approval of this work. In addition, we thank the staff and patients of Farshchian heart center for their sincere collaboration with this study.

Footnotes

Authors' Contribution: Study concept and design: F. P., and MA. S.; analysis, and interpretation of data: F. P., and KH. O.; drafting of the manuscript: F. P.; critical revision of the manuscript for important intellectual content: F. P., KH. O., and MA. S.; statistical analysis: MA. S.; Data Collection: R.M.S., A. S.

Conflict of Interests: The authors declare that they have no conflicts of interest.

Ethical Approval: IR.UMSHA.REC.1396.470.

Funding/Support: Hamadan University of Medical Sciences.

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