



# Design and implementation of a follow-up and training program of health-promoting lifestyle after the coronary artery bypass graft

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## Abstract:

**BACKGROUND:** Coronary artery bypass graft (CABG) plays an important role in reducing coronary heart disease mortality, but patients are still at risk after surgery. Consequences can be avoided if threatening behaviors are soon detected and lifestyles are promoted. Therefore, the present study aimed to evaluate, follow-up, and promote a healthy lifestyle in the patients.

**MATERIALS AND METHODS:** The present research was a quasi-experimental pre- and postintervention single-group study on 35 patients under the CABG at two hospitals affiliated to the Baqiyatallah University of Medical Sciences in Tehran from August 2020 to April 2021. The samples were selected using the purposive sampling method and the educational content was determined by creating an expert panel. We utilized the Health-promoting Lifestyle Profile II to collect data, and SPSS 22 to analyze them.

**RESULTS:** There was a significant difference between mean total scores of health-promoting lifestyle before and after the intervention and they reached from  $138.7 \pm 20$  to  $157.2 \pm 18$  ( $P < 0.0001$ ). There was also a statistically significant difference between mean scores of nutrition ( $P < 0.003$ ), physical activity ( $P < 0.0001$ ), health responsibility ( $P < 0.0001$ ), and stress management ( $P < 0.0001$ ) before and after the intervention, but there was no statistically significant difference between mean scores of interpersonal relationships, and spiritual growth before and after the intervention.

**CONCLUSIONS:** The program had a positive effect on the health-promoting lifestyle scores of patients after CABG. It is possible to increase scores of healthy lifestyles in the patients by combining face-to-face and virtual training methods as well as involving family members and relatives of patients in training and follow-up programs.

## Keywords:

Coronary artery bypass graft, health promotion, healthy lifestyle, nursing education

## Introduction

Coronary artery disease is a leading cause of death in the world. Even though the coronary artery treatment and surgery procedures have improved significantly in recent decades, statistics still indicate that this disease accounts for about 30% of deaths in developed countries and 35%–82% of deaths in developing countries, and is the second leading cause of death in Iran.<sup>[1-3]</sup>

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Coronary artery bypass graft (CABG) plays a major role in reducing the mortality rate of these patients, but these patients are probably at the risk of relapse and complications in months and years after surgery.<sup>[4,5]</sup> Patients face various mental and physical problems and complications after surgery; hence, they need a carefully guided training process to improve their health behaviors and eliminate unhealthy behaviors while following them.<sup>[6,7]</sup> Health

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and lifestyle behaviors play important roles in the control and occurrence of these diseases.<sup>[8]</sup> The individuals' lifestyles can be improved by teaching patients about different aspects of lifestyle, including healthy diets, physical activity, and stress management.<sup>[9]</sup> Lifestyle modification to healthy behaviors is effective in reducing deaths from cardiovascular diseases.<sup>[10]</sup> According to the World Health Organization, 60% of global deaths and 80% of deaths in developing countries are related to unhealthy lifestyles.<sup>[11]</sup> The age of patients with coronary artery diseases has decreased due to lifestyle changes in recent years. It is estimated that about 4%–10% of patients with CAD are at the age of under 45 years.<sup>[12]</sup> We can decrease approximately 50% of premature deaths by timely diagnosis and changing health-threatening behaviors.<sup>[11,13]</sup> A health-promoting lifestyle is a criterion used to determine health. In this type of lifestyle, people perform behaviors to promote health in a conscious, continuous, and daily manner,<sup>[14]</sup> thereby maintaining and increasing their levels of health.<sup>[11]</sup> These behaviors include six domains, namely nutrition, physical activity, stress management, health responsibility, interpersonal relationships, and spiritual growth.<sup>[11,15,16]</sup> Health promotion is the most effective way to improve health and quality of life in individuals.<sup>[17]</sup> However, promoting a healthy lifestyle and following a treatment process are important and necessary in patients undergoing CABG. However, there is not any approved educational program and package to follow and promote healthy lifestyles in these patients in Iran. The outbreak of COVID-19 caused the cancellation of most visits to clinics, limited face-to-face group classes for patients at multiple times, and restricted travels and attendance of patients' families to receive the necessary training.<sup>[18]</sup> The issue arises which teaching methods and content must be used for these patients to attract the cooperation of patients and their families, access easily to educational provisions, and maintain communication between patients and the training and follow-up team after surgery now and in the future. Therefore, we sought to use a virtual follow-up method, diversify teaching methods, and use reminders to design a training carefully-guided program according to Iranian culture, and maintain contact and follow-up of patients, attract the cooperation of patients' families, and design a manual illustrated guide.

## Materials and Methods

### Study design and setting

The present research was a quasi-experimental pre-and postintervention single-group study on patients under the CABG in Iran, Tehran, from August 2020 to April 2021. The inclusion criteria of the study were as follows: the willingness to participate in the study, hearing and vision health, psychological health, literacy, and the ability to make virtual communication with the patient.

The exclusion criteria: the unwillingness to cooperate and complications for surgery.

### Study participants and sampling

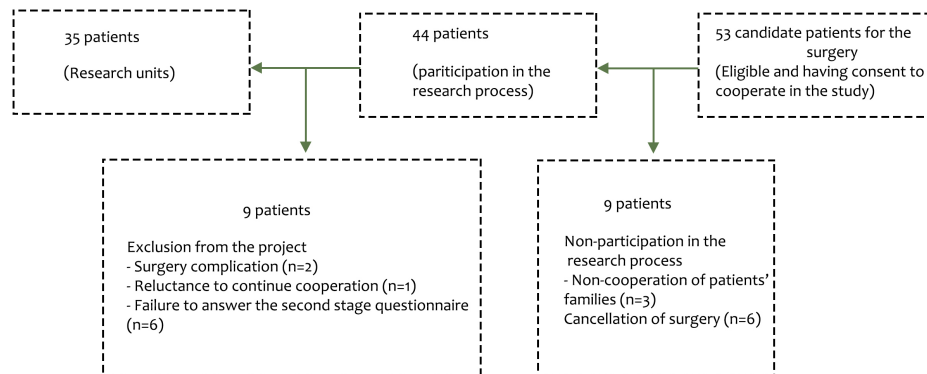
The participants were 35 patients under the CABG at two hospitals affiliated to the Baqiyatallah University of Medical Sciences in Tehran. The sample size of 32 was obtained by considering similar studies,<sup>[19,20]</sup> the type I error of 0.01 and the test power of 90% using the STATA 11.2 (Stata Corp LLC, 4905 Lakeway Drive, College Station, Texas 77845-4512 USA), and we selected 35 individuals according to the sample loss of 10% using the purposive sampling method [Figure 1].

### Data collection tool and technique

The data were collected using the demographic information questionnaire and some health-relating variables. The patients' health-promoting lifestyle scores were also determined using the Health-Promoting Lifestyle Profile II (HPLPII). The tool contained 52 questions about six domains, including nutrition, physical activity, health personality, stress management, interpersonal relationships, and spiritual growth. Its validity was confirmed by Mohammadi-Zeydi *et al.*, and its reliability by the Cronbach's alpha of 0.88–0.90 for each subscale. The evaluation of all questions was performed on a 4-point Likert scale (never = 1, 2 = sometimes, usually = 3, and always = 4). The total score of lifestyles ranged from 52 to 208. The study consisted of two main sections. First, the package design, and determination of educational content, and second, the measurement of its effectiveness [Table 1]. The first section contained the educational content obtained from the study of the latest documents and books of nursing care in heart surgery in a table with separate items in six dimensions of health-promoting lifestyle, and 11 nursing professors and experienced nurses in ICU-OH evaluated it. The results of this evaluation were discussed in a panel of experts, and the educational content of the project was prepared by consensus of the members, and it was presented in an illustrated manual for promoting a healthy lifestyle after the CABG. To encourage the patients' families to cooperate, the discussion was made with a member of the family about the project according to the patients' suggestions, and the infrastructure was provided for participation. After the surgery, the patients received the educational content face to face and in an illustrated manual for promoting a healthy lifestyle [Table 2]. In the second section, the education and follow-up were performed according to the incidence of COVID-19 via a channel in a messenger application for 3 months. At the end of the period, the questionnaires were re-responded by the research units. We finally analyzed data of the questionnaires using SPSS 22 (IBM Corp. Released 2013, IBM SPSS Statistics for Windows, Version 22.0, Armonk,

**Table 1: Research implementation and design stages**

Step 1: The package design and determination of the educational content			Step 2: Measurement of the effectiveness of the educational and follow-up program		
Stages	Duration	Result	Stages	Time	Content
Literature review	1 month	Preparing a table with separate educational items for each field	Face-to-face education	Before discharge	Familiarity with dimensions of health-promoting lifestyle; transparency of the home care and follow-up program; delivery of a manual
Survey of experienced professors and nurses	3 weeks	Collecting the written feedback containing the statement of necessity and importance of each educational item and correcting the sentences according to the Iran's culture	Virtual education and follow-up	Every 6 days	Sending educational reminders in 15 education videos, 15 short education texts, and 10 associating pictures in each domain
The expert panel formation	1 month	The analysis of opinions and preparation of educational content of the project in an illustrated manual for the healthy lifestyle promotion	Telephone follow-up	Every 2 weeks	Phone contact with the patients and their families to ensure the attendance at the virtual education program and responding to patient's questions

**Figure 1:** The process of selecting research units

NY: IBM Corp.) as well as the paired *t*-test, Chi-square test, Wilcoxon test, and Fisher's exact test.

### Ethical considerations

The present study was confirmed in the Research Ethics Committee of the Baqiyatallah University of Medical Sciences in Tehran (IR.BMSU.REC.1399.285) and also obtained a registration code in the Iranian Registry of Clinical Trials (IRCT20200822048479N1). The purposes of the study were explained to the participants, and all the patients had signed the informed consent.

### Results

The content extracted from the texts first included 61 educational items in six dimensions, and they were reduced to 44 items after the consensus of the members present at the expert group meeting, and 7 items were changed in terms of culture and common lifestyle in Iran, and items relating to the patients' families were listed in a separate section [Table 2]. The results of Fisher's exact test, Chi-square test, and independent *t*-test did not show any significant relationship between gender, age, job, education, body mass index, and EF of research units, and health-promoting lifestyle scores [Table 3]. According to the Chi-square test, there

was not any significant relationship between factors of risk such as diabetes, hypertension, and history of smoking, and lifestyle scores of the individuals [Table 4]. The analysis of HPLPII indicated that the mean score of health-promoting lifestyle was at the intermediate level ( $138.20 \pm 7$ ) in patients before the intervention. The paired *t*-test indicated the significant impact ( $P < 0.0001$ ) of the intervention on mean scores of the health-promoting lifestyle profile ( $157.2 \pm 18$ ). In other words, the mean score of health-promoting lifestyle was improving from moderate to good levels in the participants. The mean scores also showed significant differences in four domains of lifestyle before and after the intervention, namely nutrition ( $P < 0.003$ ), physical activity ( $P < 0.0001$ ), health responsibility ( $P < 0.0001$ ), and stress management ( $P < 0.0001$ ), but there was not any significant difference in mean scores in interpersonal relationships, and spiritual growth before and after the intervention [Table 5].

### Discussion

Given the current and future situation, there is a need for educational methods different from the past with easy access to educational content at any time and a follow-up schedule with minimum visits of the

**Table 2: Educational content of the study**

domains	Educational content
Nutrition	<p>A healthy diet after surgery affects your recovery process and helps you protect your heart from possible complications. Proper nutrition helps to quickly recover and gain the necessary energy</p> <p>Eat high-protein and high-calorie foods (muscle, chicken breast, egg whites, fish, low-fat dairy, soy, and unsalted nuts) for 4 weeks after surgery to restore appetite and recover</p> <p>Eat a variety of fruits and vegetables daily</p> <p>Add olive oil to your meals to prevent constipation</p> <p>You can eat bread, potato, rice, wholemeal pasta, and legumes to provide minerals and vitamins</p> <p>Eat small and frequent meals</p>
Physical activity	<p>Proper physical activity is an important pillar of health. To achieve cardiovascular health, you should have daily physical activity according to a specific schedule</p> <p>Start your activity in ICU by sitting on the bed, getting out of bed, and walking in the ward</p> <p>Follow breathing training and exercises as instructed by the nurse</p> <p>Increase your activity gradually (i.e., a maximum activity is what you can speak while moving and do not experience shortness of breath)</p> <p>Balance between activity and rest (rest between activities and take a daily nap)</p> <p>Take a break of at least 30 min between exercise and eating</p> <p>Exercise preferably in green spaces and fresh air</p> <p>Your exercise program should include warming up, training activity (walking, cycling, swimming, etc.), and cooling down</p> <p>After recovering and increasing your tolerance, exercise for at least 30 min 5 days a week</p> <p>Avoid lifting objects &gt;4.5 kg, driving, and doing pressure and stretching activities (using a vacuum cleaner, displacing room furniture, carrying heavy objects, and lifting children) up to 6 weeks</p> <p>You can have sexual activity depending on the activity tolerance and the surgeon's opinion</p> <p>You can return to work after 6–12 weeks of surgery depending on the type of job (stressful jobs: military personnel, firefighters, pilots, reporters, radio and television announcers, taxi drivers, surgeons, instructors, medical and emergency personnel, and sports referee)</p>
Stress management	<p>Stress after surgery is your enemy. Stress triggers the chain of events in the body that affects the function of your heart</p> <p>Avoid any stressful behavior and thought</p> <p>Talk to the people you love and stay away from people who cause your discomfort and stress</p> <p>Share your worries and feelings with someone. This will reduce your stress and worries (with a nurse or loved one)</p> <p>Use the methods of distraction from worries (watching movies, listening to music, reading, and enjoyable environmental illustration in mind)</p> <p>Control your anger (taking three deep breaths, think of a pleasant scene, and leaving the place)</p> <p>Think about the good things in life and be grateful and optimistic</p> <p>You can individually get psychological consultation from a nurse</p>
Interpersonal relationships	<p>Human is a social being and has needs that can only be met in a group. Human beings need to connect with others, love, and be loved to continue living</p> <p>Talk to your friends and relatives and make phone calls</p> <p>Participate in stress-free social activities (training classes, handicrafts, workshops, group meetings, and peer groups)</p> <p>Attend face-to-face and virtual training sessions</p> <p>Spend hours a week on fun and entertainment</p>
Health responsibility	<p>Responsibility guides you towards health and wellness. If you are responsible for your health, you will prevent the formation of negative thoughts, feelings, and the healing process disorder</p> <p>You are the most responsible for maintaining good health</p> <p>Follow the medication program very carefully and according to instructions (drug name, consumption time, dosage, side effects, and medication method)</p> <p>Be aware of any abnormal symptoms (fever, discharge, itching, redness, inflammation, and abnormal breathing) and see your doctor if necessary</p> <p>Be aware of the treatment follow-up and re-visit schedule</p> <p>Avoid smoking and consuming alcoholic beverages</p>
Spiritual growth	<p>Spirituality is the hidden aspect of human personality and it has been scientifically proven that addressing these issues is very effective in public health</p> <p>Participate in individual and social religious and spiritual activities</p> <p>Participate in charitable activities</p> <p>Spend hours on thanksgiving and worship</p>

Contd...

**Table 2: Contd...**

domains	Educational content
To families and relatives	<p>The roles of the patient's families and relatives in the treatment and recovery process have been proven in several studies. The patient's families and relatives can affect the speed and quality of recovery after surgery by creating appropriate conditions, active cooperation in the patient care and support. You can help your patients in the process of promoting a healthy lifestyle by accompanying and encouraging them</p> <p>Observe the low-fat and low-salt foods in preparing family food, and pay attention to the diet recommended to your patient</p> <p>Accompany your patient as much as possible in physical activity and exercise</p> <p>Reduce your stress and anxiety by accompanying the patient in the training process and receiving the necessary information so that you can help your patient in this regard</p> <p>Point out strengths and progress in the treatment process daily and this will reduce your patient's anxiety and causes further relaxation</p> <p>Provide a calm environment for the patient</p> <p>Support your patient and communicate with them verbally and nonverbally</p> <p>In the 1<sup>st</sup> week after surgery, do not leave your patients alone and be by their side</p> <p>Accompany your patient in the process of training and lifestyle changes (be aware of diet and medication and encourage the patient to follow them)</p> <p>Be aware of the treatment follow-up schedule and time of revisiting the doctor, and remind your patient</p>

ICU=Intensive care unit

**Table 3: Absolute and relative frequency distribution of some demographic characteristics of the units**

Variable	Classification	n (%)	Statistical test (P)
Sex	Male	30 (85.7)	Fisher's test (0.62)
	Female	5 (14.3)	
Age	40–55	12 (34.3)	T-test (0.36)
	56–73	23 (65.7)	
	Mean±SD	59.26±7.86	
Job	Military		Fisher's test (0.15)
	Employed	4 (11.4)	
	Retired	15 (42.9)	
	Nonmilitary		
	Employed	5 (14.3)	
	Retired	6 (17.1)	
	Housewife	5 (14.3)	
Education level	Under high school diploma	11 (31.4)	Fisher's test (0.57)
	High school diploma	11 (31.4)	
	Bachelor's degree	8 (22.9)	
	Master's degree	4 (11.4)	
	PhD	1 (2.9)	
BMI	18.5–24.9	9 (25.7)	Fisher's test (0.06)
	25–29.9	22 (26.9)	
	30–34.9	4 (11.4)	
	Mean±SD	26.7±3.11	
EF	30–39	9 (25.7)	Chi-square test (0.89)
	40–49	6 (17.1)	
	50–59	18 (51.4)	
	>60	2 (5.7)	
	Mean±SD	45.57±9.29	

SD=Standard deviation, BMI=Body mass index, EF=Ejection fraction

patients to meet patients' needs in stressful situations caused by the outbreak of COVID-19 and obligation to observe health protocols. To determine the results of promoting and following up the healthy lifestyles in patients undergoing the CABG, the present study sought to design a mixed method of the face-to-face and virtual education, and phone contact to become

compatible with the existing conditions and measure the effectiveness of this type of follow-up and education method. To this end, we determined the scores of health-promoting lifestyle scores in six dimensions. Results of data analysis indicated the significant growth of mean scores of health-promoting lifestyle. There were statistically significant differences between nutrition, physical activity, health responsibility, and stress management. In a similar study by Safabakhsh in Shiraz, the face-to-face training method was used after surgery, and then, the patients received the telephone reminder program twice in three months, and they reported significant differences in stress management ( $P < 0.036$ ), nutrition ( $P < 0.002$ ), spiritual growth ( $P < 0.001$ ), and interpersonal relationships ( $P < 0.002$ ).<sup>[19]</sup> In another study, Zafari Nobari used the method of holding group face-to-face classes in four shifts to convey educational content and reported statistically significant differences in all dimensions.<sup>[21]</sup> The results of physical activity can be compared to other studies. The results indicated that physical activity had the lowest mean score before the intervention and the highest growth and change after the intervention and follow-up among the six dimensions [Table 5]. The results of a study by Mohsenipour in Mazandaran also indicated the lowest mean score in physical activity ( $15.79 \pm 5.08$ ) that was consistent with the results of the present study.<sup>[5]</sup> The result was consistent with the results of most studies,<sup>[19,21,22]</sup> indicating the lack of attention to the importance of physical activity in a population that eventually required the CABG. The results of studies on dimensions, which had the highest growth and change in mean scores after the intervention, indicated differences that seemed to depend on the project method, for instance in the present study, the physical activity accounted for the highest growth and change after the intervention and follow-up on and it was almost similar to Safabakhsh's

**Table 4: Absolute and relative frequency distribution of some risk factors in research units**

Variable	Contracting the disease, n (%)	Noncontracting the disease, n (%)	Statistical test (P)
Diabetes	15 (42.9)	20 (57.1)	Chi-square test (0.72)
Hypertension	19 (54.3)	16 (45.7)	Chi-square test (0.71)
History of cigarette smoking	11 (24)	31.4 (68.6)	Chi-square test (0.69)

**Table 5: Comparison of mean scores of life styles before and after the intervention**

Dimensions	Mean±SD		Significance level (P)
	Before the intervention	After the intervention	
Nutrition	25.17±4.34	27.62±3.77	<0.003
Physical activity	14.77±4.46	20.68±4.08	<0.0001
Health responsibility	21.71±5.34	25.88±4.96	<0.0001
Interpersonal relationships	28.28±4.38	29±3.64	<0.269
Stress management	20.80±4.65	24.71±3.56	<0.0001
Spiritual growth	27.97±5.58	29.28±4.16	<0.133
Total score	138.7±20	157.2±18	<0.0001

SD=Standard deviation

study that physical activity with a difference of 0.6 from nutrition was in the second rank of mean score growth,<sup>[19]</sup> but Zafari found that the highest mean growth rate was related to interpersonal relationships probably due to holding group face-to-face classes for several times.<sup>[21]</sup> Unlike the present study, which did not show any significant difference in terms of interpersonal relationships, and given that the research units had the highest mean scores in interpersonal relationships before the intervention, indicating the importance and value of this dimension in the lifestyle of this population, it is thought that the dimension was changing due to the prevalence of COVID-19 and the requirement to follow health guidelines, and the lack of score growth was due to limited relationships between people and the necessity to stay at home and limited communication with friends and relatives. Due to the stress and anxiety caused by the outbreak of COVID-19 in the present study, we sought to reduce the distance between telephone calls and make virtual communication and telephone contact between the patients and the researcher so that the patients could solve their problems and ask questions in a less time interval. Torabi found that stressful situations could lead to psychological disorders such as depression and anxiety in vulnerable people.<sup>[23]</sup> The issue was also confirmed by Kwong in England under which some groups were at a high risk of depression and anxiety during the COVID-19 pandemic.<sup>[24]</sup> According to meta-analysis and clinical trial studies, people were prone to these disorders after the CABG.<sup>[25,26]</sup> Stress management measures are essential and sensitive in the COVID-19 pandemic.

### Limitation and recommendation

The prevalence of COVID-19, the cancellation of many surgeries, and the patients' fear of such a situation caused research limitations that affected the education and

follow-up program and also affected some dimensions of lifestyles; hence, the present study used the virtual follow-up and created diversity in education methods to overcome limitations of the situation. Therefore, there is a need for finding a method for highlighting the interpersonal relationships in using virtual methods in current situations. We suggest future studies examining the effects of virtual groups and the possibility of talking and exchanging opinions and experiences of patients with each other.

## Conclusions

The research results indicated that teaching dimensions of a healthy lifestyle along with a follow-up program would improve the lifestyle scores in patients undergoing the CABG. The existence of a moderate level of health-promoting lifestyle in the patients and the importance of lifestyles in preventing consequences highlighted the need to promote healthy lifestyles; hence, the patients' lifestyles can be improved according to the effectiveness of this training and follow-up program by combining face-to-face and virtual training methods and establishing follow-up programs at hospitals, as well as involving patients' family members and relatives in the program.

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### Conflicts of interest

There are no conflicts of interest.

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