



## Effect of an educational intervention based on BASNEF model on treatment adherence after coronary artery bypass surgery: A randomized clinical trial

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### Original Article

#### Abstract

**BACKGROUND:** Coronary artery bypass graft (CABG) surgery is the most effective treatment for cardiovascular disease (CVD). Adherence to treatment after CABG surgery is very important. One of the educational models used in this regard is the BASNEF (Belief, Attitudes, Subjective Norms, and Enabling Factors) model. The present study aimed to assess the effect of an educational intervention based on BASNEF model on adherence to treatment in patients after CABG surgery.

**METHODS:** The present study was a randomized clinical trial. In this study, 72 patients who had undergone CABG surgery participated in the two intervention and control groups. Patients in the intervention group took part in 4 40-minute educational sessions based on BASNEF model after discharge. The patients in both groups completed the Modanloo Adherence to Treatment Questionnaire (MATQ) and a researcher-made BASNEF model questionnaire before the intervention, after the educational intervention, and at the 3-month follow-up. Data were analyzed using independent t-test, chi-square test, Man-Whitney test, and repeated measures analysis of variance (ANOVA). Mauchly's sphericity test was used for testing sphericity and the Greenhouse-Geisser correction was used in the case of lack of sphericity. All P-values of less than 0.05 were considered significant.

**RESULTS:** The total score of the MATQ and its subscales had significantly improved in the intervention group after the intervention compared with the control group ( $P < 0.050$ ). In addition, the mean scores of the model constructs (knowledge, attitude, behavior intention, subjective norms, and enabling factors) had significantly improved after the intervention in the intervention group in comparison with the control group ( $P < 0.050$ ).

**CONCLUSION:** The educational intervention based on BASNEF model improved adherence to treatment in patients after CABG surgery. Moreover, the model constructs improved in the intervention group in comparison with the control group after the intervention.

**Keywords:** Treatment Adherence; Coronary Artery Bypass Graft Surgery; Educational Models

*Date of submission:* 22 Aug. 2019, *Date of acceptance:* 17 Feb. 2020

#### Introduction

Cardiovascular disease (CVD) has become widespread due to the development of urban life and changes in human habits.<sup>1</sup> Coronary artery disease (CAD) is one of the most common CVDs, causing various complications such as myocardial infarction (MI), angina pectoris, and heart failure.<sup>2</sup> Moreover, according to the most recent report of the World Health Organization (WHO), the prevalence of CVDs and the need for coronary artery bypass graft (CABG) surgery will reach 14.7% by 2020.<sup>3</sup> A large number of

patients with CAD who do not respond to drug therapies are candidate for CABG surgery.<sup>4</sup> After CABG surgery, the patients may be at risk of angina pectoris, MI, or even stroke. Therefore, adherence to

**How to cite this article:** Torknejad A, Babaei S, Mirmohammadsadeghi M. **Effect of an educational intervention based on BASNEF model on treatment adherence after coronary artery bypass surgery: A randomized clinical trial.** ARYA Atheroscler 2020; 16(3): 105-14.

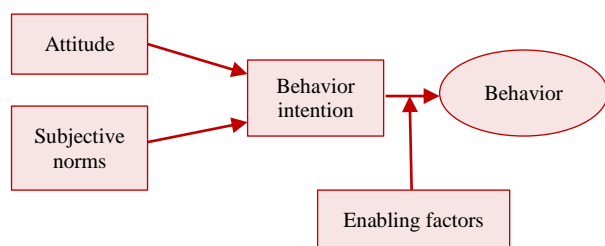
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treatment and follow-up after surgery is very important.<sup>5</sup> Due to poor adherence to the treatment and rehabilitation plan, the physical health and quality of life (QOL) of some patients worsens after surgery. Thus, adherence to treatment is a major contributor to overall health and post-surgical treatment.<sup>6</sup> Adherence to treatment and management of risk factors were found to be weak at 1 year after CABG surgery.<sup>7</sup> In some chronic diseases, nearly 50% of people do not adhere to therapeutic activities.<sup>8</sup> Non-adherent patients are important for health delivery systems, because they need more care and attention, and symptoms of their disease may lead to increased rate of hospitalization.<sup>9</sup> Furthermore, a significant part of the success of surgery in the long term depends on adherence to treatment, which is essential to prevent the recurrence of CAD.<sup>10</sup> Adherence to treatment is also the result of an interactive relationship between the patient, the social environment, and the caregiver.<sup>11</sup> Thus, the provision of sufficient information to patients is a basic responsibility of health professionals. A systematic and scientific health education program needs an appropriate model.<sup>12</sup> Nurses have a key role in educating cardiovascular surgical patients regarding the management of their post-surgical care after discharge.<sup>13</sup> Training in different ways and in different people in appropriate conditions can have significant impact on modifying awareness and attitude as well as enhancing individuals' behavior and performance.<sup>14</sup> One of these educational models is the BASNEF (Belief, Attitude, Subjective Norm, and Enabling Factors) model. In this model, in addition to knowledge and attitudes, some factors such as enabling factors and subjective norms are also important in behavioral change processes (Figure 1).



**Figure 1.** BASNEF model structure

This model is based on behavioral changes through some factors such as attitude (relatively systematic organization of beliefs about an object or position which prepares a person to react in a particular direction, enabling factors such as facilities, money, and skills that are necessary for realizing a behavior), behavioral beliefs (visible performance),

and subjective norms (perceived social pressure based on which an individual follows the wishes of those who are more important to him/her than others).<sup>15</sup> The effectiveness of the BASNEF educational model has been confirmed in several studies.<sup>16,17</sup> Patients who undergo CABG surgery have a long history of CVD. Thus, it has significant effects on their lives and they should be adherent to a particular treatment plan. Post-operation adherence to treatment after CABG surgery is poor. In addition, lack of adherence to treatment leads to complications such as atherosclerosis, MI and angina pectoris, and eventually, heart failure.

It is argued that adherence to treatment after CABG surgery is very important. In patients with chronic CAD, lack of adherence to cardio protective medications ( $\beta$ -blockers, statins, and/or angiotensin-converting enzyme inhibitors) was associated with a 10% to 40% relative increase in risk of cardiovascular hospitalizations and a 50% to 80% relative increase in risk of mortality. Thus, adherence to medication or to a treatment plan is very important.<sup>18</sup> Therefore, the role of post-surgical education is significant. In this regard, education in the right framework and under suitable conditions can be effective. Some studies suggest that the use of appropriate and scientific training models by healthcare staff can be effective in empowering patients and their families. However, in addition to the patient's need for education, the presence of the patient's family is also important.<sup>19</sup> Furthermore, different variables affect adherence to treatment; researchers have categorized these variables into patient's personal characteristics, cognitive factors, and patient's interpersonal relationship with the medical team or his/her family.<sup>20</sup> According to studies and the importance of adherence to treatment in patients after CABG surgery, this study was performed to investigate the effect of an educational intervention based on the BASNEF model on adherence to post-surgical recommendations in these patients.

## Materials and Methods

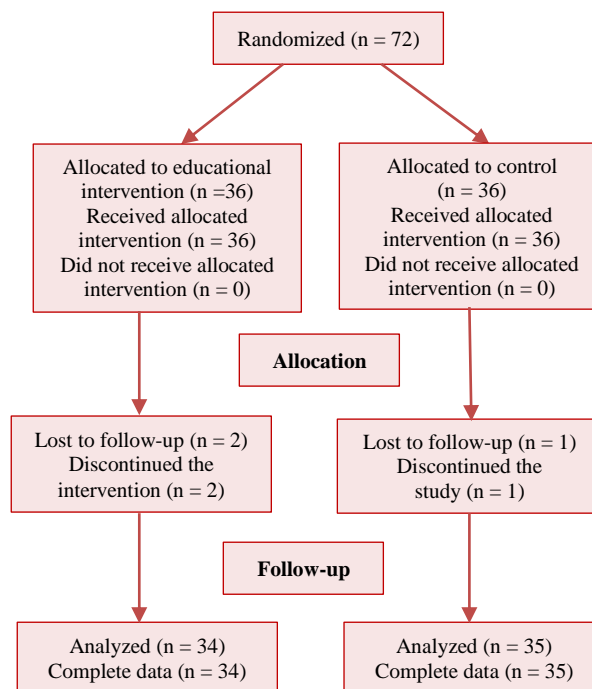
A randomized, controlled, clinical trial with parallel groups was conducted with two groups of intervention and control. The study group participants were selected from among patients undergoing CABG surgery. First, the purpose of the study was explained to all patients during discharge. Those who were willing to take part in the study were asked to provide a written consent form. The participants were chosen based on the inclusion criteria and through convenience

sampling. Next, each participant received a random numbered card and based on the number, whether it was odd or even, they were assigned to either the control or experimental groups. Sample allocation continued until the sample size reached the predetermined number (36 patients in the intervention group and 36 patients in the control group). The researcher, referring to the surgical ward in Chamran Hospital, Isfahan, Iran, selected the participants daily from 9 am to 6 pm, depending on the number of patients discharged. The protocol of this study was approved by the ethical committee of Isfahan University of Medical Sciences, Iran (IRCT20180729040629N1).

The inclusion criteria included the ability to communicate and speak Persian, lack of attendance in previous training sessions (any other studies relevant to this study), lack of history of heart surgery (first time surgery), and attendance of one family member in the training sessions. The exclusion criteria included lack of collaboration in training sessions, lack of attendance of a family member in the study sessions, and incidence of acute physical or psychological problems during training. Therefore, 2 patients in the experimental group were excluded from the study (1 patients did not attend classes, and 1 patients did not complete the questionnaires); thus, 34 patients were analyzed in the intervention group. In control group, 1 patient was excluded from the study (the patient did not complete the questionnaires before discharge); thus, 35 patients were analyzed in the control group. First, the purpose of the study was explained for the experimental and control groups, then, the training sessions were held for the experimental group. In order to observe ethical principles, the control group received only hospital discharge education and a post-operative care education booklet. The experimental and control groups completed the Modanloo Adherence to Treatment Questionnaire (MATQ) and a researcher-made questionnaire based on the BASNEF model before the educational intervention. Then, the 4, 40-minute educational sessions were conducted for patients in the intervention group during 4 weeks after discharge. The 36 patients were divided into groups of 4 patients (Figure 2). The educational sessions were performed each day of the week for a different group of patients. The first session was immediately after discharge. In the subsequent weeks, 3 other sessions were held.

The educational sessions based on BASNEF model consist of 6 phases. Phase 0 includes the initial assessment, familiarity with group members,

brief statements of subjects for the intervention group (preliminary meeting).



**Figure 2.** Patients flow in the control and intervention group

Phase I consists of increasing knowledge and changing the beliefs, attitudes, and behaviors of patients based on the educational model (Knowledge and attitude). Phase II includes the formation of behavioral intention based on the educational model (Behavioral intention). In phase III, the formation of subjective norms is addressed based on the educational model (Subjective Norms). In phase IV, the enabling factors based on the educational model and their impact on performance are explained (Enabling Factors), and phase V consists of the reviewing of the content of the previous sessions. In the educational sessions, recommendations about post-operative care were presented using PowerPoint, educational pamphlets, booklets, and videos. Furthermore, lectures, question and answer, group discussions, and problem-solving method were employed in the sessions for patients who had undergone CABG surgery to teach them self-care and management of post-surgery complications (Table 1). An educational package about post-surgical care recommendations and the researcher's telephone number were provided for patients so that they could contact the researcher if they had any problems during the intervention with regard to post-operative care.

**Table 1.** The content of the educational sessions in the intervention group for patients after coronary artery bypass graft surgery

Phase	Session number	Content of sessions
Phase 0: Initial assessment, familiarity with group members, brief statements of subjects for the intervention group (introduction)	Initial meeting	Greetings, introducing educators to patients and patients to each other, explaining the number of sessions and their structure for patients, completing of the consent form by patients, and completing of the questionnaires in the first stage before the intervention
Phase I: Increasing knowledge and changing the beliefs, attitudes, and behaviors of patients based on the educational model (Knowledge and attitude)	Session 1	A short speech about heart disease and explaining CABG surgery, Talking about the post-operative lifestyle to change the attitudes and beliefs of patients and encourage them to learn more about heart disease and heart surgery, and providing a definition of healthy nutrition after CABG surgery and a list of foods with a high salt content
Phase II: The formation of behavioral intention based on the educational model (Behavioral intention)	Session 2	Educating patients about healthy behavior after surgery and what is exactly expected of them, explaining the necessity of the cessation of high-risk behaviors such as smoking cigarettes and tobacco products, alcohol consumption, and use of canned foods, ready-made foods, and fast food due to their high fat and high salt content, explaining how drugs are used and the importance of adherence to regular drug use, explaining the side effects of the medications used by patients, educating them about the importance of blood pressure control and how to measure and record it, educating them on relaxation techniques in order to avoid stress and anxiety, and explaining correct exercise and its levels for post-operative patients based on consultation with the physician
Phase III: Formation of subjective norms based on the educational model (Subjective Norms)	Session 3	A meeting with a family member of the patient who has the greatest impact on the patient in managing their living conditions, talking about its role in improving the patient's healthy behavior and adherence to treatment after surgery
Phase IV : Explanation of enabling factors based on the educational model and their impact on performance (Enabling Factors)	Session 4 (in this sessions and all meetings)	Providing patients with a pamphlet and a booklet in order to continue education during the study, introducing patients to therapeutic centers where they can go if they need medical care, and providing them with the researcher's phone number in case they have a question during the study
Phase V: Evaluation	After 4 weeks of intervention	Reviewing the content of past sessions, and completing of the questionnaires on the last session by patients

CABG: Coronary artery bypass graft

Data were collected at 3 stages, before the intervention, after 4 weeks of educational intervention, and after 12 weeks for follow-up. Patients in both groups were contacted in order to collect data 12 weeks after the intervention and were asked to complete the MATQ and a researcher-made BASNEF model questionnaire.

The data collection tools used were the MATQ and a researcher-made BASNEF model questionnaire. The BASNEF model questionnaire includes 2 main sections, a demographic characteristics form and questions related to the educational model. The second section comprises (49 questions) the 4 subscales of knowledge (11 items; e.g., Do you know how CABG surgery is

performed?), attitude (9 items; e.g., adherence to post-surgical care), behavioral intention (7 items; e.g., Had you earnestly decided to continue the treatment after CABG surgery?), subjective norms (5 items; e.g., To what extent will your family help you in post-surgical care?), and enabling factors (8 items; e.g., educational sessions about post-surgical care are available to me). All items are scored based on a 3-point Likert scale (yes = 3; I do not know = 2; no = 3). The validity of the BASNEF model questionnaire was confirmed by 10 experts in cardiac surgery, cardiac nursing, and health education of the School of Nursing and School of Health in Isfahan University of Medical Sciences. After the announcement of the results by the



professors, the necessary corrections were made. The content validity ratio (CVR) values of most of the items were higher than 0.70. Cronbach's alpha was used to determine the reliability of the questionnaire; the Cronbach's alpha of the constructs of knowledge, attitude, behavioral intention, subjective norms, and enabling factors was 0.80, 0.85, 0.82, 0.93, and 0.83, respectively. The Cronbach's alpha of the model constructs ranged from 0.75 to 0.83. Because the calculated Cronbach's alpha for each studied construct was higher than 0.70, it can be said that this tool's consistency is acceptable.

The MATQ consists of the 7 subscales (40 items) of focus on treatment (9 items; e.g., many treatments have become a part of my daily life; total score: 0-45), willingness to participate in treatment (6 items; e.g., I'm looking forward to the advice of the medical team; total score: 0-35), ability to adapt (7 items; e.g., before doing anything, I think about its impact on my illness; total score: 0-35), adapting the treatment with life plan (5 items; e.g., the more complex the treatment recommendations, the more difficult it will be to adapt it to the life plan; total score: 0-25), adherence to treatment (4 items; e.g., having different responsibilities does not keep me from continuing treatment; total score: 0-20), commitment to treatment (5 items; e.g., I maintain hope in the treatment by thinking about its positive aspects; total score: 0-25), and doubt in the implementation of treatment (3 items; e.g., contradictory recommendations from the treatment team prevent me from continuing treatment; total score: 0-15). The total score of adherence to treatment ranges from 0 to 200. The validity of the MATQ was 0.914, with a Cronbach's alpha of 0.921, and the reliability of the questionnaire was approved through test-retest reliability estimation for a 2-week interval ( $r = 0.858$ ).<sup>21</sup>

The statistical analysis was conducted in SPSS statistical software (version 16; SPSS Inc., Chicago, IL, USA). The normality distribution of the quantitative data was determined using Kolmogorov-Smirnov test. Continuous and categorical variables were presented as mean  $\pm$  standard deviation (SD) and absolute number (percentage), respectively. Independent t-test or Mann-Whitney U test were used for comparing normal and non-normal variables between groups. Chi-square test (or Fisher's exact test) was used for comparing categorical variables in groups. Repeated measures analysis of variance (ANOVA) was used to evaluate the intervention effect in time. Mauchly's sphericity test was used for testing sphericity and the Greenhouse-Geisser correction was used in the case

of lack of sphericity. A P-value of less than 0.05 was considered significant.

## Results

We enrolled 69 CABG patients in the study, 34 individuals in the intervention group and 35 in the control group. No significant difference was observed between the groups regarding age ( $P = 0.880$ ), gender ( $P = 0.520$ ), level of education ( $P = 0.150$ ), occupation ( $P = 0.190$ ), marital status ( $P = 0.990$ ), and duration of the disease ( $P = 0.320$ ), and cardiac risk factors such as diabetes ( $P = 0.730$ ), hypertension (HTN) ( $P = 0.390$ ), hyperlipidemia ( $P = 0.730$ ), and smoking ( $P = 0.300$ ). The average age of the participants in the intervention and control group was  $62.06 \pm 9.53$  and  $62.43 \pm 8.39$  years, respectively. All of the participants in the intervention ( $n = 34$ ; 100%) and control group ( $n = 35$ ; 100%) were married. In the intervention group, 17 (50%), 10 (24.9%), 7 (20.6%), and 0 (0%) participants were self-employed, retired, housewives, and employed, respectively. In the control group, 13 (37.1%), 7 (20%), 14 (20%), and 1 (2.9%) participants were, respectively, self-employed, retired, housewives, and employed. In the intervention group and control group, 12 (35.3%) and 15 (42.9%) participants were women, respectively. In the intervention group, 3 (8.8%), 21 (61.8%), 8 (23.5%), and 2 (5.9%) participants were illiterate, and had a primary school education, high school diploma, and academic degree, respectively. In the control group, 7 (20%), 21 (60%), 7 (20%), and 0 (0%) participants were illiterate, and had a primary school education, high school diploma, and academic degree, respectively (Table 2).

At baseline, before the intervention, there were no significant differences in total score of the MATQ and its subscales between the two groups ( $P > 0.050$ ) (Table 3).

Table 3 shows that after the intervention and at the 3-month follow-up, the mean score of the MATQ and the scores of focus on treatment, willingness to participate in treatment, ability to adapt, combining treatment with life, commitment to treatment, doubt in the implementation of treatment, and adherence to treatment increased in the intervention group compared to the control group ( $P < 0.001$ ).

The results of within group analysis showed that the mean score of the MATQ and the scores of focus on treatment, willingness to participate in treatment, ability to adapt, combining treatment with life, commitment to treatment, doubt in the implementation of treatment, and adherence to treatment increased in the intervention group after the intervention compared to baseline ( $P < 0.050$ ).

**Table 2.** Demographic characteristics and some clinical history variables in the intervention and control groups

Variables	Level	Intervention group (n = 34)		Control group (n = 35)		P*
		n (%)	n (%)	n (%)	n (%)	
Gender	Female	12	35.3	15	42.9	0.520
	Male	22	64.7	20	57.1	
Occupation	Employed	0		1	2.9	0.190
	Self-Employed	17	50.0	13	37.1	
	Retired	10	24.9	7	20.0	
Education	Housewives	7	20.6	14	40.0	0.150
	Illiterate	3	8.8	7	20.0	
	Primary school education	21	61.8	21	60.0	
	High school diploma	8	23.5	7	20.0	
Disease duration	Academic degree	2	5.9	0	0.0	0.320
	Less than 1 month	11	32.4	5	14.3	
	1 month to 11 months	11	32.4	16	45.7	
	1 year	2	5.8	4	11.4	
Marital status	More than 1 year	10	29.4	10	28.6	0.990
	Married	34	100	100	35.0	
	Single	0	0	0	0	
Diabetic disease (yes)	-	16	47.1	15	42.9	0.730
HTN (yes)	-	21	61.8	25	71.4	0.390
Hyperlipidemia (yes)	-	16	47.1	15	42.9	0.730
Smoking (yes)	-	7	20.6	4	11.4	0.300
Age (Mean ± SD)	-	62.06 ± 9.53		62.43 ± 8.39		0.880**

\* Chi-square test (or fisher's exact test if needed), \*\* Independent t-test

SD: Standard deviation

According to the Bonferroni multiple comparison test, the mean total score of the MATQ at baseline

was significantly lower than immediately after the intervention and 3 months after the intervention.

**Table 3.** Comparison of the mean score of adherence to treatment and its dimensions between the two groups

Variables	Groups	Before the intervention	After the intervention	3-month follow-up	P**
Total score	Intervention	122.20 ± 55.39 <sup>λ</sup>	163.19 ± 68.61 <sup>ε</sup>	167.14 ± 59.17 <sup>ε</sup>	< 0.001
	Control	128.36 ± 26.06	127.20 ± 65.80	127.13 ± 69.22	0.970
	P*	0.420	< 0.001	< 0.001	< 0.001 <sup>¥</sup>
Focus on treatment	Intervention	26.60 ± 99.30 <sup>λ</sup>	37.60 ± 3.35 <sup>ε</sup>	37.30 ± 15.75 <sup>ε</sup>	< 0.001
	Control	30.90 ± 47.65	30.60 ± 59.77	30.30 ± 54.78	0.980
	P	0.080	< 0.001	< 0.001	< 0.001 <sup>¥</sup>
Willingness to participate in treatment	Intervention	24.05 ± 6.01 <sup>λ</sup>	31.40 ± 68.27 <sup>ε</sup>	32.30 ± 41.35 <sup>ε</sup>	< 0.001
	Control	22.70 ± 74.69	21.50 ± 49.23	21.30 ± 43.30	0.110
	P*	0.400	< 0.001	< 0.001	< 0.001 <sup>¥</sup>
Ability to adapt	Intervention	22.40 ± 6.76 <sup>λ</sup>	29.40 ± 71.06 <sup>ε</sup>	30.30 ± 00.82 <sup>ε</sup>	< 0.001
	Control	24.70 ± 7.01	23.40 ± 57.23	22.20 ± 89.49	0.660
	P*	0.170	< 0.001	< 0.001	< 0.001 <sup>¥</sup>
Combining treatment with life	Intervention	13.20 ± 76.59 <sup>λ</sup>	17.20 ± 35.72 <sup>ε</sup>	16.10 ± 65.53 <sup>ε</sup>	< 0.001
	Control	14.30 ± 41.83	14.20 ± 83.19	14.10 ± 97.27	0.710
	P*	0.410	< 0.001	< 0.001	< 0.001 <sup>¥</sup>
Adherence to treatment	Intervention	12.30 ± 59.12 <sup>λ</sup>	16.30 ± 21.36 <sup>ε</sup>	16.20 ± 91.15 <sup>ε</sup>	< 0.001
	Control	13.50 ± 73.37	14.30 ± 03.18	14.20 ± 97.02	0.370
	P*	0.280	0.007	< 0.001	0.002 <sup>¥</sup>
Commitment to treatment	Intervention	13.10 ± 74.88 <sup>λ</sup>	19.30 ± 47.24 <sup>ε</sup>	20.30 ± 47.04 <sup>ε</sup>	< 0.001
	Control	13.40 ± 11.18	13.20 ± 83.33	13.10 ± 31.94	0.220
	P*	0.430	< 0.001	< 0.001	< 0.001 <sup>¥</sup>
Doubt in the implementation of treatment	Intervention	9.10 ± 35.76 <sup>λ</sup>	12.10 ± 24.84 <sup>ε</sup>	14.10 ± 00.48 <sup>‡</sup>	< 0.001
	Control	9.30 ± 73.47	9.20 ± 31.03	9.10 ± 57.87	0.570
	P*	0.570	< 0.001	< 0.001	< 0.001 <sup>¥</sup>

Data are reported as mean ± Standard deviation (SD).

\* P-value of between group comparisons obtained from two-sample t-test (or Mann-Whitney U where appropriate); \*\* P-value of within group comparisons; ¥ P-value for time group obtained from repeated measures analysis of variance; <sup>λ</sup>, <sup>ε</sup>, <sup>‡</sup> The results of Bonferroni multiple comparison test

The use of the same letter is illustrative of lack of statistical difference between the groups.

Moreover, the mean scores of focus on treatment, willingness to participate in treatment, ability to adapt, combining treatment with life, commitment to treatment, and adherence to treatment at baseline were significantly lower than after the intervention and 3 months after the intervention. The mean score of doubt in the implementation of treatment was significantly different between the intervention and control groups within all study ( $P < 0.050$ ). There were no significant differences in the control group at different stages of the study ( $P > 0.050$ ).

Furthermore, there were significant trend effect as interaction of time, and the group were statistically significant for score of total adherence to treatment and all subscales ( $P < 0.050$ ). The scores increased in the intervention group, while little change was observed in the control group (Table 3).

According to the results presented in table 4, at baseline, there were no significant differences in BASNEF model constructs between the two groups ( $P > 0.050$ ). An increase was observed in the mean score of knowledge, attitude, subjective norms, enabling factors, and behavioral intention after the intervention and at the 3-month follow-up in the intervention group compared to the control group ( $P < 0.001$ ).

Moreover, there was an increase in the mean score of knowledge, attitude, subjective norms, enabling factors, and behavioral intention in the intervention group as a result of the intervention ( $P < 0.050$ ); however, there were no significant differences in the mean scores of these constructs in the control group ( $P > 0.050$ ).

The Bonferroni multiple comparison test showed that in the intervention group the mean scores of knowledge, attitude, subjective norms, enabling factors, and behavioral intention were significantly higher immediately after the intervention and 3 months after the intervention compared to before the intervention. Nevertheless, there was no significant difference in the scores of these constructs 3 months after the intervention compared to immediately after the intervention (Table 4).

## Discussion

The results of the study indicated that the age range of patients in the intervention and control group was 40-83 years and 45-80 years, respectively. Therefore, there was no significant difference between the intervention and control groups in terms of mean age. This finding was in line with that of the study by Meng et al.<sup>22</sup> They also found no significant difference between the experimental and control groups in terms of gender, occupation, and education; all the participants in their study were also married.<sup>22</sup>

**Knowledge and Attitude:** The mean score of knowledge of the patients was significantly higher immediately and 3 months after the intervention in intervention group compared to the control group. This means that an educational intervention with the appropriate model can increase patients' level of knowledge. This finding was in line with that of previous studies. Tol et al. found that patients' knowledge and attitude regarding blood pressure increased after the educational intervention.<sup>23</sup>

**Table 4.** Comparison of the mean scores of BASNEF model constructs between the two groups

Variables	Groups	Before the intervention	After the intervention	3-month follow-up	P <sup>**</sup>
Knowledge	Intervention	52.11 ± 27.19 <sup>ε</sup>	95.17 ± 45.23 <sup>λ</sup>	99.2 ± 47.17 <sup>λ</sup>	< 0.001
	Control	54.22 ± 55.59	55.14 ± 58.75	54.19 ± 75.21	0.970
	P <sup>*</sup>	0.600	< 0.001	< 0.001	< 0.001 <sup>¥</sup>
Attitude	Intervention	89.70 ± 19.95 <sup>ε</sup>	99.00 ± 83.97 <sup>λ</sup>	99.00 ± 83.97 <sup>λ</sup>	< 0.001
	Control	93.90 ± 12.38	94.50 ± 61.38	93.30 ± 20.55	0.460
	P	0.060	< 0.001	< 0.001	0.002 <sup>¥</sup>
Behavioral intention	Intervention	73.10 ± 87.69 <sup>ε</sup>	88.19 ± 65.51 <sup>λ</sup>	89.13 ± 92.86 <sup>λ</sup>	< 0.001
	Control	76.17 ± 73.70	73.21 ± 15.76	73.18 ± 06.91	0.700
	P <sup>*</sup>	0.420	0.003	< 0.001	< 0.001 <sup>¥</sup>
Subjective norms	Intervention	48.17 ± 24.14 <sup>ε</sup>	91.19 ± 76.14 <sup>λ</sup>	94.10 ± 71.22 <sup>λ</sup>	< 0.001
	Control	46.24 ± 86.71	45.22 ± 14.93	45.40 ± 34.53	0.930
	P <sup>*</sup>	0.790	< 0.001	< 0.001	< 0.001 <sup>¥</sup>
Enabling factors	Intervention	40.10 ± 29.06 <sup>ε</sup>	95.70 ± 59.46 <sup>λ</sup>	93.60 ± 57.92 <sup>λ</sup>	< 0.001
	Control	39.23 ± 10.56	37.21 ± 14.42	38.14 ± 10.22	0.920
	P <sup>*</sup>	0.780	< 0.001	< 0.001	< 0.001 <sup>¥</sup>

Data are reported as mean ± Standard deviation (SD).

\* P-value of between group comparison obtained from two-sample t-test (or Mann-Whitney U where appropriate); \*\* P-value of within group comparison; ¥ P-value for time group obtained from repeated-measure analysis of variance; <sup>ε, λ</sup> The results of Bonferroni multiple comparison test

The use of the same letter is illustrative of lack of statistical difference between groups.

In a study on education in relation to cardiac rehabilitation and patients' level of knowledge, it was found that patients' level of knowledge about heart disease had increased after the intervention,<sup>24</sup> which is in line with the current study findings. In the present study, the attitude of the patients had improved immediately and 3 months after the intervention. This indicates that this educational intervention can improve the knowledge and attitude of patients about surgery and conditions of care after CABG surgery.

**Behavior intention, subjective norms, and enabling factors:** The educational intervention was effective on behavioral intention in patients participating in the study; the mean scores of behavioral intention in the experimental group were higher immediately and 3 months after the intervention, but they did not differ in the control group. In the study by Sarayloo et al., the educational program based on BASNEF model increased the scores of knowledge, attitude, behavior intention, and performance in the experimental group.<sup>25</sup> As a result of the present study, subjective norms had increased in the patients in the intervention group after 4 weeks of educational intervention and at the 12-week follow-up. These findings are in accordance with that of other studies. Poshtchaman et al. reported an increase in the mean score of subjective norms in the intervention group after 4 weeks of intervention and at the 12-week follow-up in comparison with pre-intervention.<sup>26</sup> The mean score of the enabling factors increased in the intervention group in comparison with the control group after 4 weeks of educational intervention and at the 12-week follow-up. This illustrates that social protection of the family and friends and the adaptation of the treatment to the individual's living conditions will increase adherence to treatment after surgery.

**Modanloo Adherence to Treatment Questionnaire and its subscales:** The data indicated a significant difference in the mean score of the adherence to treatment subscale of the MATQ after 4 weeks of educational intervention and at the 12-week follow-up in the intervention group compared to the control group. In this regard, the results of the study by Wu et al. on heart failure patients also suggested that oral and written education along with the facilitation of education are effective in improving adherence to drug regimen,<sup>27</sup> which is in line with the findings of this study. Moreover, Aggarwal et al. and Gance-Cleveland also confirmed the importance of the presence of family members with the patient in receive training education.<sup>28,29</sup> In the present study, the mean score of

the focus on treatment subscale of the MATQ increased immediately and 12 weeks after the intervention compared to pre-intervention in the intervention group. Moreover, the mean score of the willingness to participate in treatment subscale also improved immediately and 3 months after the intervention compared to pre-intervention. This finding suggests that patients' willingness to participate in the treatment adherence and drug therapeutic recommendation education course after the intervention had increased. The study of Lin et al. on risk factors after CABG confirmed this finding.<sup>30</sup> In this regard, the findings of the present study showed that the mean score of the ability to adapt subscale in the experimental group increased immediately and 3 months after the intervention compared to the control group. Similarly, the study by French et al. showed that the individual's ability to control him/herself in relation to these recommendations and to understand his/her condition are important factors in the patient's commitment to medical recommendations.<sup>31</sup>

The mean score of the doubt in the implementation of treatment subscale changed after the intervention and at the 3-month follow-up compared to pre-intervention. Furthermore, this score was higher 3 months after the intervention compared to immediately after the intervention. It can be concluded that the educational intervention based on the BASNEF model has influenced the subscale of doubt in the implementation of treatment in CABG patients immediately after the intervention, while this effect has not been constant after 3 months of follow-up in the intervention group.

This suggests that in addition to influencing the level of knowledge and attitude of patients, the educational intervention affected their level of performance in postoperative care which augmented their level of trust in the medical team. In this regard, a study on the factors related to non-adherence to medication has shown that adherence to treatment is affected by several factors and has various barriers.<sup>32</sup> These include socioeconomic factors (treatment costs), health system factors, disease characteristics, and patient-related factors (level of knowledge, attitude, and behavior intention). Therefore, in order to increase adherence to treatment, it is necessary to consider each of these problems and to resolve them. As in this study, the educational model was used to educate patients on various factors influencing treatment adherence, its results confirm the present study findings.<sup>32</sup>

The present study data indicate that the educational sessions in the framework of the



educational model for patients after CABG surgery also increased the total score of the MATQ and its subscales. In addition, the level of knowledge, attitude, behavioral intention, subjective norms, and enabling factors that include socioeconomic status increased in patients in the intervention group after the intervention. However, Chien *et al.* found that the need-based training of the patient and family in the intensive care unit led to increased knowledge and awareness, but did not have a significant impact on the level of dietary adherence.<sup>33</sup> The data of this study indicated that education based on the needs of patients and their family has a significant effect on various aspects of adherence to treatment. It seems that consideration of other aspects of adherence to treatment, in addition to adherence to diet, can also elevate the total score of adherence to treatment in patients after CABG surgery.

### Conclusion

The purpose of this study was to implement an education program based on the BASNEF model and evaluate its effect on adherence to post-surgical treatment based on the MATQ. The results were obtained with the consideration of all the factors influencing the study period and the participants. The results of this study suggested that an educational intervention based on the framework of an appropriate model can increase the total score of adherence to treatment and the scores of focus on treatment, willingness to participate in treatment, ability to adapt, combining treatment with life, adherence to treatment, commitment to treatment, and doubt in the implementation of treatment. Moreover, it can increase the patients' scores in the model constructs (knowledge, behavioral intention, subjective norms, and enabling factors). After CABG surgery, patients need training and follow-up for postoperative care, which is the task of the medical team, especially nurses. Therefore, it is recommended that this educational model be used to improve care after CABG surgery, reduce postoperative complications, and improve adherence to treatment. Patients who have undergone CABG surgery experience changes in different aspects of their life, so the medical team, especially nurses, should know these factors and educate them based on their needs. This study shows that identifying the needs of patients and educating them after surgery based on an appropriate education model can affect patient's knowledge, behavior intention, attitude, subjective norms, and enabling factors. Thus, patients' adherence to treatment will improve after CABG surgery.

### Acknowledgments

The authors would like to thank all patients who participated in this study. They would also like to express their gratitude to the Health Education Office of the Chamran Heart Research Center affiliated to Isfahan University of Medical Sciences. They appreciate the cooperation of the personnel of the surgery ward. They would also like to thank the research deputy of Isfahan University of Medical Sciences for their financial support for the study. This study has been derived from the MSc Thesis No. 397201 approved by Isfahan University of Medical Sciences.

### Conflict of Interests

Authors have no conflict of interests.

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