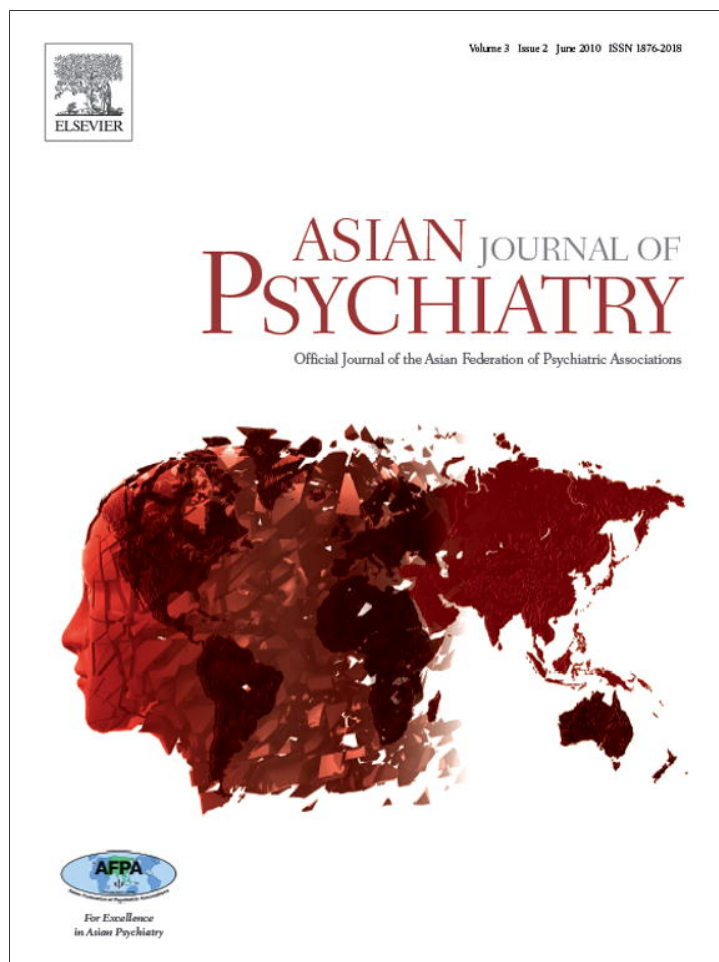


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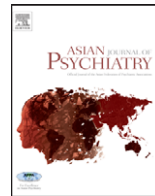
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## The effects of a PRECEDE-based educational program on depression, general health, and quality of life of coronary artery bypass grafting patients

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### ABSTRACT

**Background:** Depression is commonly reported as a consequence of coronary artery bypass grafting surgery. It is the most important barrier to proper treatment of cardiac patients, causing failure in accepting the condition, decreasing the motivation in following the therapeutic recommendations, and negatively affecting the patients' function and quality of life.

**Objective(s):** The objective of this study was to investigate the effects of a PRECEDE-based educational program on depression, general health, and quality of life in coronary artery bypass grafting surgery patients.

**Methods:** The experimental study included 54 post-bypass surgery patients in Isfahan Cardiovascular Research Center. The patients were randomly assigned to intervention and comparison groups (27 patients in each). The data were collected using four questionnaires (Cardiac Depression Scale, General Health Questionnaire-12, SF-36, and a PRECEDE-based questionnaire to measure predisposing, reinforcing, enabling factors, and self-help behaviors). All subjects were pre-tested. The intervention, consisting of nine educational sessions per week (60–90 min each) was implemented. The patients were followed for 2 months post-intervention and post-tested at the end of the second month.

**Results:** Following the educational intervention, the mean scores of predisposing factors, enabling factors, reinforcing factors and self-helping behaviors were significantly increased in the intervention group, compared to the comparison group ( $p < 0.001$ ). The mean score for depression in the comparison group ( $104.5 \pm 30.4$ ) and intervention group ( $112.8 \pm 21.9$ ) decreased significantly following educational intervention, but the change was more pronounced in the intervention group compared with the control group ( $66.2 \pm 22$  vs.  $89.2 \pm 27.8$ ). The difference between the two groups on the basis of general health was statistically significant ( $p < 0.0001$ ). Improvements in quality of life on the basis of physical function ( $p < 0.04$ ), role limitations resulting from emotional status ( $p < 0.01$ ), and mental health ( $p < 0.04$ ) were statistically significant.

**Conclusion:** The findings of the study confirmed the effectiveness of an educational program based on the PRECEDE Model on decreasing depression level, improving general health, and increasing quality of life in coronary artery bypass grafting surgery patients.

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### 1. Introduction

Cardiovascular disease (CVD) is the leading cause of death in the majority of countries (Haidari et al., 2001). Coronary artery bypass grafting (CABG) has become one of the most widely used surgical procedures for the treatment of coronary heart disease (Panago-

poulou et al., 2006). The main objective of coronary bypass is decreasing of heart angina and increasing life expectancy and quality of life (Babaei et al., 2007). An aspect of quality of life after cardiac surgery is the mental status of patients in which depression is the most important and common psychological consequence (Davoodi, 1999). Depression is commonly reported as a consequence of CABG surgery and is associated with an elevated risk of mortality and morbidity as well as disability, increased medical care utilization, and decreased daily functioning (Violetal et al., 2006). Clinically significant depression has been reported in 54% of patients after CABG surgery (Renerio et al., 2000). Psychological

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problems after a cardiac surgery may include anxiety, depression, restlessness, irritability, panic and anger due to the feeling of powerlessness, lack of control, and reduced self-esteem (Violetal et al., 2006). Depression has dramatic consequences on the quality of life in both the patients and their families. It increases health care costs and also may influence patients' compliance with prescribed medications and recommended lifestyle changes (Francois and Nancy, 2000). Quality of life is an index of health care and control of disease, such as coronary heart disease (Harrison et al., 1996). Quality of life has emerged as an important concept and outcome in health and health care. In public health and medicine, the concept of health-related quality of life refers to a person or group's perceived physical and mental health over time. Public health professionals use health-related quality of life to measure the effects of numerous disorders, short and long-term disabilities, and disease in different populations (Health-Related, 2002). The primary purpose of the study was to investigate the effects of a PRECEDE Model-based educational program on depression, general health, and quality of life in bypass surgery patients.

**2. Theoretical framework**

The PRECEDE (Predisposing, Reinforcing and Enabling Causes in Educational Diagnosis and Evaluation) Model, developed by Green and Kreuter (1991), provided the theoretical foundation to develop the study's educational program. The application of the PRECEDE Model has been reported in a number of studies in which the model was used to assist in defining and organizing the educational objectives of the programs (Green and Kreuter, 1991). The model systematically considers social, epidemiological, behavioral, educational, policy, and administrative diagnoses in planning, implementing, and evaluating the behavioral modifications of such educational interventions (Glanz et al.,

1990). The PRECEDE framework attempts to identify a type of education which results in certain changes and eventually leads to improved quality of life (Benson and Taub, 1993; Bey and Holmes, 1990).

Self-help behaviors in CABG patients include special exercises, walking, relaxation, breathing exercises, making a social support network, and participation in cardiac rehabilitation programs. Predisposing factors containing knowledge and beliefs about risk factors of CAD, CABG, depression and its symptoms, and knowledge and beliefs about self-help behaviors are also included. Enabling factors are skills for doing self-help behaviours and accessing educational resources. Reinforcing factors include recommendation and encouragement from family, friends, and physicians for doing self-help behaviours as well as demonstrating positive feeling afterward. Fig. 1 depicts the variables which were investigated in the study.

**3. Materials and methods**

The study was a clinical trial with experimental design which was carried out on patients attending the Isfahan Cardiovascular Research Center, a major heart center in Iran. The experimentation took place between August and November of 2007. Permission to conduct the study was obtained from the Ethics Committee at Isfahan University of Medical Sciences. Inclusion criteria included being 35–70 years old and undergoing CABG surgery. There were 80 patients who were interviewed between 6 and 8 weeks following the operation and invited to participate in the study. Sixty-two of the patients accepted the invitation and signed consent forms. The 62 patients were randomly assigned to intervention and comparison groups. Seven patients dropped out of the study and one died during the course of the intervention. The remaining 54 patients completed the study in the intervention ( $n = 27$ ) and comparison ( $n = 27$ ) groups.

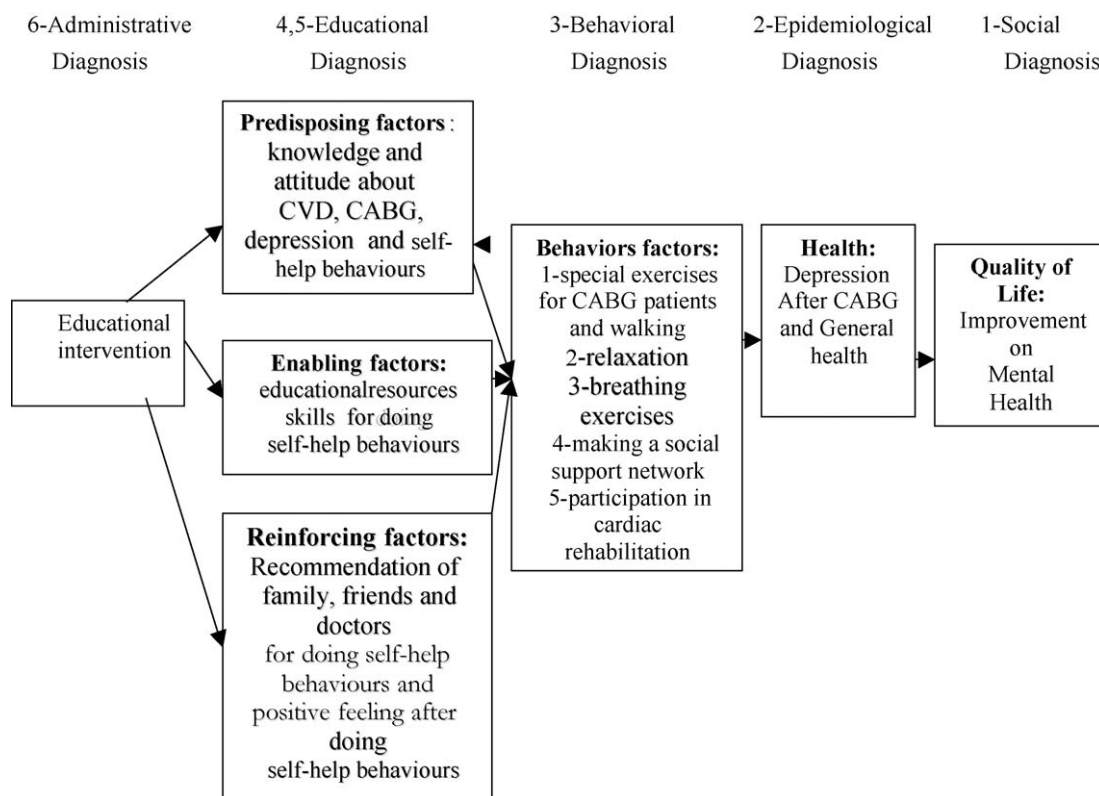


Fig. 1. Summary of variables studied based on PRECEDE Model.

#### 4. Intervention

Both the comparison and the intervention groups received the same usual medical care, consisting of regular check-ups by a cardiologist. Patients who were assigned to the intervention group were offered the training program which was planned based on the PRECEDE Model in nine sessions, each lasting 1.5 h, on a weekly basis for 2 months but the comparison group didn't any training program.

In order to providing an effective social support, patients in the intervention group were divided into three subgroups (two groups of 11 men and one group of 6 women). During the sessions, patients in each of the three groups and their partners, whose participation was encouraged, were informed of CAD risk factors and risk factor modification. Specifically, in the first and second sessions, patients were informed of CAD risk factor modification. Additionally, they were informed of CABG and Type A behavior, stress and depression, and the symptoms. In the third session, patients expressed their emotions following cardiac surgery, using buzz group discussion and self-revelation methods, as well as attempting to establish social support systems. During the fourth and fifth sessions, patients were taught health-promotion strategies for coping with life stressors such as breathing and relaxation exercises based on the work of Van Dixhoorn (1997). The purpose of these exercises was to increase the patient's sense of relaxation and body awareness. Patients were given the opportunity to take an audiocassette tape home to practice the breathing and relaxation exercises. In the sixth and seventh sessions, subjects were taught special physical exercises for CABG patients and practiced them with a nurse as well as being informed about a cardiac rehabilitation program. The patients were taught proper walking in the eighth session and participated in a suitable walking program with friends. In the ninth session, the participants consulted with a psychologist to recognize and deal with problems in the process of behavior change. All sessions were led by a psychologist, physician, and either a nurse or a health educator. The patients were followed for 2 months and took part in continuing educational programs on health behaviors. During the follow-up period, patients were given some homework assignments. They were also asked to complete a checklist on frequency of self-help behaviors that they had experienced daily and submit it to Isfahan Cardiovascular Center every 2 weeks. Table 1 presents the outline of the program.

#### 5. Data collection

Four questionnaires were used to collect the data. The first questionnaire was the Cardiac Depression Scale Inventory which was used to measure the degree of depression. The questionnaire contains 26 items and uses a 7-point Likert-type scaling. The questionnaire has high internal consistency (Cronbach's Coefficient

Alpha = 0.90). The content validity of the questionnaire was determined by a panel of experts consisting of college professors in health education and psychiatrists. The 26 items measure seven subscales, namely sleep, anhedonia, uncertainty, mood, cognition, hopelessness, and inactivity. The scores may range from 26 to 182 (Hare and Cynthia, 1996). The mean depression score in the study was  $80.3 \pm 27.8$ . Stratification of scores in our study for the Cardiac Depression Scale was on the basis of the Beck Depression Inventory II. In the Beck Depression Inventory II, Scores 10–19, 20–25, and  $>25$  indicate mild, moderate, and severe symptoms, respectively (Mirella et al., 2006). In our study, scores of 80–99, 100–110, and  $>110$  indicated mild, moderate and severe symptoms, respectively.

The second questionnaire was General Health Questionnaire (GHQ-12) that was originally used by Goldberg in 1972 (Goldberg, 1972). The GHQ-12 is a psychological screening instrument. It employs a Likert-type scaling, ranging from zero to three. The internal consistency was estimated to be 0.81 in our study.

The third questionnaire was developed on the basis of the PRECEDE Model to measure Predisposing, Reinforcing, and Enabling factors as well as self-help behaviors. The instrument consists of a knowledge scale with 11 multiple-choice questions; an attitude scale with eight items which are answered using a 5-point Likert-type scaling; and a 2-part scale to measure (1) educational resources, using five multiple-choice items, and (2) five yes/no questions to measure skills. The questionnaire also includes five items to measure self-help behaviors. The content validity of the questionnaire was determined by a panel of experts consisting of college professors in health education, psychiatry and cardiology. The reliability coefficients ranged from 0.65 to 0.80.

The fourth questionnaire was SF-36 which measures health status in eight dimensions: physical function (10 items), role limitation caused by physical problems (4 items), bodily pain (2 items), mental health (5 items), role limitations caused by emotional problems (3 items), fatigue (4 items), and general health perception (5 items). Internal consistency for this questionnaire was reported to be 0.70 (Montazeri et al., 2005).

The experimental and comparison groups completed the four questionnaires prior to intervention and at the end of the 4-month follow-up. The Statistical Package for the Social Sciences (SPSS) was used to analyze the data, employing *t*-test for correlated samples, *t*-test for independent samples, analysis of variance (ANOVA), chi-square test, Mann–Whitney test, and Wilcoxon test. The level of significance was set at 0.05.

#### 6. Results

Completed questionnaires were returned by 54 patients in both the intervention and comparison groups. The mean age of the patients in intervention and comparison groups were  $56.85 \pm 7.21$  and  $56.56 \pm 7.56$ , respectively. Nearly 33.30% of the patients were retired and 40.80% had completed primary education. There was no

**Table 1**  
Contents of the intervention sessions.

Session	Contents
1	The concepts of atherosclerosis and its risk factors, AMI and CABG (predisposing factors)
2	Type A behavior, stress and depression and their symptoms (predisposing factors)
3	Expression of emotions following CABG using Buzz discussion groups and self-revelation, also making social support systems (reinforcing and enabling factors)
4	Health-promoting strategies for coping with stress such as breathing and relaxation exercises (predisposing and enabling factors)
5	Doing proper breathing and relaxation exercises as assigned by psychologist (enabling factors)
6	Health-promoting strategies for coping with stress such as special physical exercise for CABG, introduction of cardiac rehabilitation program and its benefits (predisposing factors)
7	Performance of correct special physical exercise by a nurse (enabling factors)
8	Proper walking, participation in a walking program with friends of Isfahan heart association (predisposing and enabling factors)
9	Identification of problems in the process of behavior change by counseling with a psychologist (reinforcing and enabling factors)

**Table 2**  
Means and standard deviations of knowledge, attitude, skills, self-helping behaviors, general health, depression and health status dimensions (based on SF-36) in two groups before and after educational intervention.

Measure	Pretest				P-Value	Posttest				P-Value
	Intervention		Control			Intervention		Control		
	M	SD	M	SD		M	SD	M	SD	
Knowledge	66.8	11.3	73.8	15.1	0.06	147.4	2.45	69.2	18.5	0.00
Attitudes	24.6	2.04	25.2	1.9	0.22	38.2	2.6	24.2	3.01	0.00
Skills	1.22	0.6	1.29	0.6	0.66	9	1.2	1.7	0.9	0.00
Behaviors	1.6	1.2	2.03	1.2	0.29	12.5	3.4	3.5	2.4	0.00
Depression	112.8	21.9	104.5	30.4	0.25	66.2	22	89.2	27.8	0.001
General health	18.30	5.53	16.15	5.41	0.15	10.56	5.07	13.30	5.1	0.001
SF-36 dimensions										
Physical function	55.6	17.9	59.62	20.25	0.57	82.59	11.6	73.51	19.1	0.04
Physical role	10.18	18.6	25.92	34.3	0.04	42.59	28.4	37.96	36.32	0.6
Pain	41.74	25.9	48.40	24.20	0.33	69.18	20.4	64.40	24.01	0.43
General health	57.40	14.6	59.44	20.9	0.68	66.33	21.5	59.14	24.9	0.26
Vitality	40.37	17.5	48.70	22.1	0.13	64	20.4	55	18.8	0.09
Social function	45.83	27.2	55.09	30	0.24	76.85	24.6	72.22	29.07	0.53
Emotional role	24.69	34	34.56	37.5	0.31	85.18	26.6	61.72	39.9	0.01
Mental health	46.37	20.3	52	18.8	0.29	73.03	18.4	64.44	19.03	0.09
Physical sum score	41.50	14.1	48.35	18.9	0.13	65.17	15.01	58.75	19.8	0.18
Mental sum score	39.3	20.9	47.5	22.2	0.16	74.78	17.05	63.34	22.7	0.04

statistically significant difference between the two groups on the basis of age, level of education, and employment status. Other than a history of coronary disease, the participants were free from other illness.

The pretest means and standard deviations for knowledge, attitude, skill, and behaviors were  $66.80 \pm 11.3$ ,  $24.60 \pm 2.04$ ,  $1.22 \pm 0.60$ ,  $1.60 \pm 1.20$ , respectively, in the intervention group. In the comparison group, the same indices were  $73.80 \pm 15.10$ ,  $25.20 \pm 1.90$ ,  $1.29 \pm 0.60$ ,  $2.03 \pm 1.20$ . The posttest measures were  $147.40 \pm 2.45$ ,  $38.20 \pm 2.6$ ,  $9.00 \pm 1.20$ ,  $12.50 \pm 3.40$ , respectively, in the intervention group, and  $69.20 \pm 18.50$ ,  $24.20 \pm 3.01$ ,  $1.70 \pm 0.90$ ,  $3.50 \pm 2.40$ , respectively, in the comparison group (Table 2).

Following the educational intervention, group differences on the basis of knowledge and attitude measures of predisposing factors were statistically significant ( $p < 0.001$ ). Group differences on the basis of posttest measures of enabling factors and self-helping behaviors were statistically significant ( $p < 0.001$ ). Pretest measures of depression in intervention and comparison groups were  $112.80 \pm 21.70$  and  $104.50 \pm 30.40$ , respectively, and the difference was not statistically significant. At posttest, the depression scores decreased to  $66.20 \pm 22.00$  and  $89.20 \pm 27.88$  in intervention and comparison groups, respectively which were statistically significant.

Group differences on the basis of the measure of general health at pretest ( $18.30 \pm 5.53$  vs.  $16.15 \pm 5.41$ ) were not statistically significant. The scores decreased to  $10.56 \pm 5.07$  and  $13.30 \pm 5.17$  in the intervention and comparison groups, respectively, at posttest.

Patients in the intervention group showed statistically significant posttest improvements in all eight subscales of the SF-36, whereas the comparison group showed significant improvement in only five subscales. The mean of improvement in quality of life in the intervention group was higher than comparison group in eight subscales. However, only differences on physical function ( $p < 0.004$ ) and role limitation resulting from emotional status were statistically significant ( $p < 0.01$ ). Correspondingly, the sum scores of mental component increased in the intervention group more than comparison group ( $p < 0.04$ ) (Table 2).

## 7. Discussion

The study investigated the effect of a PRECEDE Model-based educational program on the depression, general health, and the

quality of life of bypass surgery patients. The findings of the study showed that the intervention group had a higher score in predisposing, reinforcing and enabling factors, and self-helping behaviors following the educational intervention than did the comparison group. The mean scores of depression decreased in both the intervention and comparison groups from pretest to posttest but the decrease was more pronounced in the intervention group compared to the comparison group (41% vs. 14%). The mean scores for general health were unfavorable (8–29) but upon the completion of the educational intervention the scores increased in both the intervention and comparison groups (46% vs. 23%). The findings showed statistically significant differences in subscales of the SF-36 inventory. Improvement of quality of life was higher in the intervention group than it was in the comparison group.

These findings suggest that an educational program based on PRECEDE Model framework can improve depression levels, the general health, and the quality of life of patients following CAB. The importance of these findings is that an educational program based on PRECEDE Model framework is beneficial and effective in promoting self-helping behaviors, decreasing depression level, improving general health, and eventually increasing the quality of life of patients after CABG, mainly because it focuses on responsibility and self care. Our findings are similar to those of Holst (2001), who observed that depression after 6 months of consultation was decreased from 92.20% to 76.60% in congestive heart failure patients. Our findings are also similar to those of Andreeas et al., who showed improvements in seven subscales of the SF-36, and reductions on depression, anxiety, anger, and perceived stress in intervention and control group groups (Michalsen et al., 2005). Babae et al and Dhdarie's findings also showed the effect of a health education program on quality of life for patients with CABG (Panagopoulou et al., 2006; Dhdary, 2003). Our findings on predisposing factors (knowledge, beliefs), enabling factors (skills and availability of educational resources), reinforcing factors, behavioral factors, and health problem are similar to a study by Ruth in relation to increasing these factors in an attempt to reduce the level of depression (Ruth and Anthony, 2002).

The present study differs from Ellen and colleagues' study, who observed that short behavioral modification programs reduced cognitive aspects of type A behavior and hostility, but showed no favorable effects on depression (Ellen et al., 2005). The use of the CDS questionnaire and applying PRECEDE Model framework in our

study may be the source of the difference. A number of systematic reviews of the literature have shown that using theory in crafting interventions may lead to more powerful effects than do interventions that are developed without a theoretical framework (Glanz et al., 2008).

There were some limitations in the current study that should be considered. There were patients who, following the CABG, were not willing to participate in the educational program of behavior modification, which resulted in a small sample size. Potential users of PRECEDE should be aware of some challenges in applying the model. The model is heavily data-driven, and its application may require greater financial and human resources, technical skill, and time than are available in some situations.

In conclusion, the significance of the study is that it provided some evidence for usefulness of the model in designing interventions to improve the mental health and increase the quality of life of patients with coronary artery bypass grafting.

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