

# The effect of a text message and telephone follow-up program on cardiac self-efficacy of patients with coronary artery disease: A randomized controlled trial

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## ABSTRACT

**Background:** Cardiac self-efficacy is an essential factor in persistence of healthy behaviors in patients with coronary artery disease (CAD). Today, telenursing methods have numerous applications in health care. Therefore, this study aimed to determine the effect of a text message and telephone follow-up program on cardiac self-efficacy of patients with CAD.

**Materials and Methods:** This was a randomized controlled trial on 70 patients with CAD who were hospitalized in Shahid Chamran Hospital (Isfahan, Iran). The participants were randomly assigned to the experimental and control groups. Collection of data on cardiac self-efficacy was performed before, 3 months after, and 4 months after the beginning of the intervention using Cardiac Self-Efficacy Scale designed by Sullivan *et al.* During the 3 months of intervention, six messages were sent to the subjects each week and calls were made twice a week in the first month and once a week during the second and third months. The statistical analysis of data was performed using independent *t*-test, Chi-square, Mann–Whitney U test, and repeated measures analysis of variance (ANOVA).

**Results:** Before the intervention, there was no significant difference between the mean scores of cardiac self-efficacy of the two groups. However, 3 months and 4 months after the beginning of the intervention, the mean score of cardiac self-efficacy in the experimental group was significantly higher than in the control group ( $P < 0.001$ ).

**Conclusions:** The text message and telephone follow-up program is effective in promoting the cardiac self-efficacy of patients with CAD.

**Key words:** Coronary artery disease, Iran, self-efficacy, telenursing

## INTRODUCTION

Among cardiovascular diseases, coronary artery diseases (CADs) are the most common cause of morbidity and mortality around the world.<sup>[1]</sup> In Iran,

there has been a rapid growth in the prevalence of CADs and morbidity and mortality resulting from them. CADs have been the cause of 46% of mortality cases and their incidence rate is 181.4 in every 100,000 individuals. Based on the available statistical reports, the prevalence of CADs in Isfahan is 19.4%.<sup>[2]</sup> In addition to causing congestive heart failure, cardiac arrhythmias, and cardiogenic shock,<sup>[3,4]</sup> CADs impose many expenses in the field of care and treatment. The expenses of treatment and absence from work of these diseases are estimated at 26.77 billion Rials per year.<sup>[4]</sup> The ideal treatments for CADs include pharmaceutical, interventional, and surgical measures, management of risk factors, and lifestyle modifications.<sup>[5-7]</sup> Although factors such as age, gender, and family history cannot be changed

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through lifestyle modification interventions in patients with CAD, cognitive-behavioral factors such as self-efficacy can be considered in the promotion of health.<sup>[8]</sup>

From the perspective of social cognitive theory, self-efficacy refers to the individuals' understanding of their own ability to change or continue a behavior successfully.<sup>[9]</sup> Promotion of self-efficacy is effective on the improvement of treatment adherence and healthy behaviors of patients.<sup>[10]</sup> Thus, nurses can improve self-care in patients through promotion of their self-efficacy.<sup>[11]</sup> Promotion of self-efficacy is an important component of cardiac patient care programs. Previous studies have shown that promotion of cardiac self-efficacy can be effective in lifestyle modification, improvement of cardiovascular risk factors, and prevention of rehospitalization of patients with CAD.<sup>[11,12]</sup>

An intervention implemented to promote cardiac self-efficacy is patient follow-up.<sup>[13]</sup> Follow-up is an important component of nursing services.<sup>[14]</sup> In the health care system, various methods are used in order to follow patients' status. Traditional follow-up methods consist of patients' referral to care centers in person or home visits by health care personnel. In spite of these methods being efficient, they require human resources, time, and high expenses.<sup>[15]</sup> Therefore, in recent years, use of mobile communications in following patients with chronic diseases has increased.<sup>[16]</sup> Use of mobile communication methods in nursing (telenursing), in addition to saving time and money in treatment measures, makes measures such as following patients, performing nursing interventions, and educating and supporting patients and their families by nurses possible.<sup>[17]</sup>

An efficient, easy, and cost-effective method of telenursing is follow-up through text message and telephone.<sup>[15,18]</sup> Text message follow-up is a new, effective, and cost-effective communication method which makes following patients' status and transference of health information possible in the most remote areas.<sup>[15]</sup> Telephone follow-up is one of the most cost-effective and efficient methods of follow-up in chronic diseases, and can reduce unnecessary patient visits and facilitate access to specialized care.<sup>[18]</sup> Today, text message and telephone follow-up methods are used as suitable methods of providing training in order to improve patient management, promote patients' health behavior, and support patients and their families.<sup>[15,19]</sup> Use of these two-communication methods has made easy, safe, and cost-effective follow-up possible for patients with CAD, and can be effective in the primary and secondary prevention of CAD and promotion of healthy behaviors.<sup>[12,20-22]</sup>

The efficacy of telenursing through text message and telephone follow-up in the management of CADs has been studied in a number of previous studies.<sup>[20-24]</sup> These

studies have obtained contradictory results regarding the efficacy of these two methods of follow-up. A number of these studies confirm the positive effect of the text message and telephone follow-up methods on changing patients' healthy behaviors.<sup>[20,22]</sup> However, the results of a number of them showed that these two methods had been unable to affect self-care ability and management of risk factors in patients.<sup>[23,24]</sup>

Due to the contradictory results of previous studies and the limited number of studies performed in this respect in Iran, the present study was performed with the aim of determining the effect of a text message and telephone follow-up program on cardiac self-efficacy of patients with CAD.

## MATERIALS AND METHODS

The present study was a clinical trial. The study subjects consisted of patients with CAD who were hospitalized in the cardiac wards of Shahid Chamran Hospital (Isfahan, Iran) in October–November 2014 and met the inclusion criteria. The participants were selected using convenience sampling method. The sample size was determined in 95% confidence interval and 80% power as 32 individuals in each group. Due to the possibility of loss of subjects, in total, 70 individuals were entered into the study.

The subjects were randomly (through the random selection of cards with the numbers 1 and 2 by the patients) divided into two groups of intervention ( $n = 35$ ) and control ( $n = 35$ ).

The inclusion criteria consisted of diagnosis of CAD by a cardiologist, age 35–75 years, familiarity with Persian language, being literate (able to read and write), having stable physical condition, lack of any recognized mental conditions or mental and motor disabilities, lack of any visual, speech, and hearing difficulties, having access to a telephone at home and a personal or family mobile phone.<sup>[2,16,25]</sup> The exclusion criteria consisted of unwillingness to participate in the study, hospitalization or death during the study period, simultaneous participation in cardiac rehabilitation programs, and changing of telephone and mobile number and not informing the researcher.<sup>[15,16,26]</sup> Data collection was performed in the two groups of patients before, 3 months after, and 4 months after the beginning of the intervention. The data collection tool comprised two parts. The first part consisted of questions on demographic characteristics and information on the disease (age, gender, education level, and marital status, history of risk factors such as increase in blood glucose, hypertension, dyslipidemia, smoking, and history of hospitalization). The second part consisted of the Cardiac Self-Efficacy Scale designed by Sullivan

*et al.*<sup>[27]</sup> This scale is composed of 16 questions which evaluate the patients' self-efficacy in terms of maintenance of performance, management of disease symptoms, and regulation of cardiac risk factors using a 5-point Likert scale. Each question obtains a score ranging from 0 to 4, with 4 representing the highest degree of confidence (the option of very much) and 0 the lowest degree of confidence (the option of lack of confidence). The total score of this scale ranges from 0 to 64; higher scores represent higher self-efficacy. Scores of 0–32 show low self-efficacy and scores of 33–64 show high self-efficacy.<sup>[2,27]</sup> The Cardiac Self-Efficacy Scale is a standard questionnaire, the reliability and validity of which have been approved by researches performed in Iran and other countries. In the study by Shamsizadeh, the validity of this scale was approved in Iran and its reliability was approved through internal consistency method and calculation of Cronbach's alpha ( $\alpha = 0.977$ ).<sup>[28]</sup> In previous studies, Cronbach's alpha of this scale has been calculated as 0.87–0.90<sup>[27]</sup> and 0.77.<sup>[10]</sup> In the present study, Cronbach's alpha of this scale was 0.935.

The patients were informed of the goals of the study and informed consents were obtained from them. Then, the researcher's colleague, who was unaware of the groups and goals of the study, completed the questionnaires through interviews with patients. After primary data collection, the home telephone number and mobile number of the patients were obtained. To ensure that messages were sent, the researcher activated the delivery option in her mobile phone.<sup>[17]</sup> Finally, the subjects were randomly divided into two groups.

During the 3 months of text message follow-up, six messages were sent to the subjects each week. In total, during the intervention period, 72 text messages were sent to each study subject. Each text message consisted of a maximum of 160 words.<sup>[16]</sup> The context of the text messages sent to the intervention group comprised training based on the content of the Cardiac Self-Efficacy Scale in terms of physical activity, diet, weight management, medication use, and shortness of breath, fatigue, and chest pain management, normal social activity level, marital relationship, stress management, smoking cessation, and blood pressure, blood glucose, and lipid level management.<sup>[28]</sup> Text message follow-up of the control group patients was achieved through messages with contents other than cardiac self-efficacy, such as health messages.<sup>[29]</sup> It should be noted that in order to comply with ethical principles, all messages related to cardiac self-efficacy were sent to control group participants at the end of the study.

In the course of the 3 months of telephone follow-up, telephone calls were made two times per week during

the first month and once a week during the second and third months. On average, the duration of each call was 15 min, and in total, 16 calls were made to each subject.<sup>[16]</sup> The content of telephone conversations in the intervention group was related to the assessment of cardiac self-efficacy in terms of the context of the messages sent to the participants. It should be noted that for the promotion of self-efficacy in the field of marital relationship, a male colleague of the researcher performed follow-up for male patients.<sup>[28]</sup> In case of any problems, the situation was analyzed with the help of the participant in order to find the cause of the problem and propose solutions.<sup>[16]</sup> The content of telephone calls made to the control group participants was not related to cardiac self-efficacy, but consisted of greeting and thanking the participants.<sup>[30]</sup> In order to comply with ethical principles, during telephone calls made to the control group participants, all their questions regarding CAD were answered. The questionnaire was completed again by the researcher's colleague through interviews in both groups 3 months and 4 months after the beginning of the intervention.

Statistical analysis of data was conducted using Student's independent *t*-test, Chi-square, Mann-Whitney U test, and repeated measures analysis of variance (ANOVA) in SPSS software (version 18; SPSS Inc., Chicago, IL, USA). Thus, data obtained from 32 patients in the intervention group and 32 patients in the control group were analyzed.

### Ethical considerations

All possible ethical issues addressed as explained above and the participants signed a written informed consent. The research project has been approved by vice-chancellor of research of Isfahan University of Medical Sciences.

### RESULTS

Mean age of study participants in the intervention group was 57.8 years with a standard deviation of 7.04. In the control group, it was 55.2 years with a standard deviation of 9.9. The results of independent *t*-test showed no significant difference between the two groups in terms of mean age ( $t = 1.19$ ,  $P = 0.24$ ). Moreover, the results showed that the two groups were not significantly different in respect to gender, education level, and marital status, history of risk factors such as increase in blood glucose, hypertension, dyslipidemia, smoking, and history of hospitalization [Table 1]. Independent *t*-test showed that before the intervention, mean cardiac self-efficacy scores of the two groups were not significantly different ( $P = 0.78$ ). However, 3 months and 4 months after the beginning of the intervention, mean cardiac self-efficacy score of the intervention group was significantly higher than the control group ( $P < 0.001$ ). Repeated measures ANOVA showed

**Table 1: Comparison of the distribution of demographic characteristics and disease information of subjects in the two groups**

Demographic characteristics and disease information	Situation	Intervention group		Control group		Statistical tests	P value
		n	%	n	%		
Gender	Female	11	34.4	10	31.2	$\chi^2$ N <sup>2</sup> =0.07	0.79
	Male	21	65.6	22	68.8		
Educational level	Below diploma	22	68.8	25	78.1	Mann-Whitney U Z=0.87	0.38
	Diploma	8	25	6	18.8		
	Collegiate	2	6.2	1	3.1		
Marital status	Married	27	84.4	29	90.6	$\chi^2$ N <sup>2</sup> =1.6	0.45
	Divorced	1	3.1	0	0		
	Widow	4	12.5	3	9.4		
History of hyperglycemia	Yes	11	34.4	11	34.4	$\chi^2$ N <sup>2</sup> =0	1
	No	21	65.6	21	65.6		
History of hypertension	Yes	18	56.2	15	46.9	$\chi^2$ N <sup>2</sup> =0.56	0.45
	No	14	43.8	17	53.1		
History of dyslipidemia	Yes	15	46.9	17	53.1	$\chi^2$ N <sup>2</sup> =0.25	0.62
	No	17	53.1	15	46.9		
History of smoking	Yes	11	34.4	7	21.9	$\chi^2$ N <sup>2</sup> =1.24	0.27
	No	21	65.6	25	78.1		
History of hospitalization	Yes	24	75	23	71.9	$\chi^2$ N <sup>2</sup> =0.08	0.78
	No	8	25	9	28.1		

that mean cardiac self-efficacy score of the control group at the three times of data collection did not significantly differ ( $P = 0.75$ ). Nevertheless, it showed that this score significantly differed between the three data collection times in the intervention group ( $P < 0.001$ ). Furthermore, Fisher's least significant difference (LSD) showed that mean cardiac self-efficacy scores obtained 3 months and 4 months after the beginning of the intervention were significantly higher than those before the intervention. LSD also showed that the mean score obtained 4 months after the beginning of the intervention was significantly higher than that obtained 3 months after the beginning of the intervention ( $P < 0.001$ ) [Table 2].

## DISCUSSION

The aim of the present study was to determine the effect of a telephone and text message follow-up program on cardiac self-efficacy of patients with CAD. No significant differences were found between the intervention and control groups in terms of demographic variables, information on the disease, and mean cardiac self-efficacy score before the intervention.

The study by Park *et al.*, was performed with the aim of determining the efficacy of a text message intervention on medication adherence in patients with CAD.<sup>[12]</sup> They found no significant difference between the two groups in terms of demographic variables, information on the disease,

**Table 2: Comparison of the mean score of cardiac self-efficacy of subjects in the two groups at different times**

Time	Groups				Independent t-test	
	Intervention		Control		t	P value
	Mean	SD	Mean	SD		
Before the intervention	30.5	8.3	29.9	7.7	0.29	0.78
3 months after beginning the intervention	53.1	5.6	30.7	7.8	13.17	<0.001
4 months after beginning the intervention	59.1	3.1	30.1	7.6	20.01	<0.001
Repeated measures ANOVA						
f	174.24		0.28		-	
P value	<0.001		0.75			

ANOVA: Analysis of variance, SD: Standard deviation

and self-efficacy in correct use of medication dose at the beginning of the intervention.<sup>[12]</sup>

The results of the present study showed that 3 and 4 months after the beginning of the intervention, mean cardiac self-efficacy score of the intervention group was significantly higher than the control group. Norman *et al.*, studied the effect of a text message-based weight loss program on weight loss and dietary habits of overweight individuals.<sup>[22]</sup> They found that the intervention group subjects, compared to the control group subjects, had a greater reduction in weight and improvement in dietary habits at the end of



the intervention.<sup>[22]</sup> Furber *et al.* performed a study on the effect of a telephone intervention on the physical activity of cardiac patients.<sup>[20]</sup> They found that intervention group patients, compared to the control group subjects, showed a significant difference in terms of physical activity self-efficacy, and frequency and duration of physical activity 6 weeks and 6 months after the intervention.<sup>[20]</sup> However, results of the study by Sadeghi Shermeh *et al.*, showed that the two text message and telephone follow-up groups had no significant difference with the control group in terms of mean prothrombin time.<sup>[24]</sup> This was not in agreement with the results of the present study.

The results of the present study also illustrated that, contrary to the control group, mean cardiac self-efficacy score of the intervention group significantly differed before, and 3 months and 4 months after the intervention. Park *et al.* found that text message follow-up of patients with CAD was effective in the improvement of self-efficacy and use of correct medication dose.<sup>[12]</sup> This finding was in accordance with the findings of the present study. Mousavifar *et al.* studied the effect of text message and telephone follow-up methods on the degree of adherence to treatment regimen in patients with diabetes.<sup>[16]</sup> They found that both text message and telephone follow-up methods were effective on the degree of adherence to treatment regimen in patients.<sup>[16]</sup> Wu *et al.* found that text message and telephone follow-up of cardiac patients with diabetes did not cause a significant difference between the intervention and control groups in terms of improvement of self-efficacy and self-care behavior.<sup>[23]</sup> This was not in accordance with the findings of the present study.

The most important limitation of the present study was information obtained from other sources such as the treatment team, counterparts, and media which could affect patients' cardiac self-efficacy and could not be controlled by the researcher. Furthermore, improvement or worsening of patients' symptoms in time could affect their cardiac self-efficacy results. This factor could not be controlled by the researcher. Another limitation of the present study was the short follow-up time after the intervention. The limited time available for the student thesis, and thus, performing the intervention resulted in the short follow-up time after the intervention. Therefore, to increase the generalizability of findings, it is suggested that further studies be conducted in this respect with longer follow-up duration.

## CONCLUSION

Based on the findings of the current study, telenursing is an appropriate method for promotion of cardiac self-efficacy in patients with CAD. Due to the high incidence of CAD and importance of long-term follow-up in patients with CAD, simple and cost-effective follow-up methods are

required for the promotion of cardiac self-efficacy level of patients. Telenursing methods of telephone and text message follow-up were effective in the promotion of cardiac self-efficacy of patients with CAD. Thus, nurses, as the key members of the health and treatment team, can use these communication methods in the effective follow-up of patients with CAD.

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## Conflicts of interest

There are no conflicts of interest.

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