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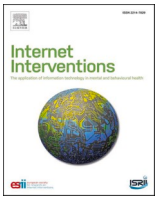

Comparison of the effect of telephone follow-up with social network follow-up program on self-efficacy and depression in patients undergoing coronary artery bypass graft surgery: A randomized controlled trial

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ABSTRACT

Introduction: Coronary artery bypass graft (CABG) surgery is a common procedure to improve blood flow to the heart muscles, but patients often face challenges during the recovery period. Self-efficacy and depression play crucial roles in patient outcomes. Telephone follow-up and social network follow-up have been introduced as interventions to enhance self-efficacy. This study aims to compare the effectiveness of telephone follow-up and social network follow-up on self-efficacy and depression in CABG patients.

Method: The study is a single-blinded, randomized controlled trial conducted at Shahid Rajaee Heart Hospital in Tehran, Iran. The sample size was determined to be 99 patients who met the inclusion criteria. Data were collected using a demographic questionnaire, Sullivan's cardiac self-efficacy questionnaire, and the Beck Depression Inventory (BDI). Participants were assigned to three groups: control, telephone follow-up, and WhatsApp follow-up using randomization. Data were analyzed using IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, N.Y., USA).

Results: The results revealed significant improvements in self-efficacy and reductions in depression scores for both the telephone and WhatsApp follow-up groups compared to the control group following the intervention ($p < 0.001$). Additionally, the mean self-efficacy score was higher and the mean depression score was lower in the WhatsApp follow-up group than in the telephone follow-up group after the intervention ($p < 0.001$).

Discussion: The findings provide valuable insights for healthcare professionals in choosing appropriate interventions to enhance patients' self-efficacy levels and improve mental health outcomes. Both telephone follow-up and social network follow-up interventions have their own advantages and can be effective in supporting patients' recovery after CABG surgery.

1. Introduction

Coronary artery bypass graft (CABG) surgery is a common surgical procedure performed to improve blood flow to the heart muscles (Noor Hanita et al., 2022). While the surgery itself is effective in improving cardiac function and reducing symptoms, patients often face various challenges during the recovery period (Parizad et al., 2022). These challenges may include physical discomfort, psychological distress, and reduced self-efficacy, which can significantly impact their overall well-being (Goli et al., 2023).

Self-efficacy refers to an individual's belief in their ability to successfully perform a specific task or achieve a specific goal (Kim et al., 2022). In the context of CABG surgery, self-efficacy can be related to a patient's confidence in their ability to manage their postoperative recovery and adhere to their treatment plan (Eghbali et al., 2022). Depression, on the other hand, is a mood disorder that can affect a

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patient's overall quality of life and may be related to postoperative challenges such as pain, fatigue, and emotional distress (Lagzi et al., 2023).

To support patients' recovery and improve their self-efficacy levels, various follow-up interventions have been introduced, such as telephone follow-up and social network follow-up (Gohari et al., 2022; Yıldız and Karagözoğlu, 2023; Yuroong et al., 2021). Follow-up care is crucial in improving patient outcomes and preventing postoperative complications, with telephone follow-up involving healthcare professionals contacting patients via phone calls to provide support, education, and answer any questions or concerns, while social network follow-up utilizes online social networks or platforms to create virtual communities where patients can interact, share experiences, and receive emotional support (Arad et al., 2021). Another form of telephone follow-up involves healthcare professionals contacting patients through phone calls to provide support, monitor their progress, and answer any questions they may have (Thompson et al., 2019), while social network follow-up leverages social networks such as family and friends to provide support and encouragement to patients (Dobkin et al., 2020).

Previous research has suggested that both telephone follow-up and social network follow-up can be effective in improving patient outcomes after CABG surgery. Bani Ardalan et al. (2022) conducted a study with the aim of "comparing the effectiveness of implementing two methods of discharge planning and telephone follow-up by nurses on the self-efficacy of caregivers of patients with stroke." Their study results indicated that after intervention there was a statistically significant difference in the average self-efficacy scores among the three groups, suggesting differences between the control group and the telephone follow-up groups, as well as between the telephone follow-up and discharge planning groups (Bani Ardalan et al., 2022).

Furthermore, in the study conducted by Moradi et al. (2017) with the aim of "determining the effect of telephone follow-up by nurses on the self-efficacy of women with type 2 diabetes" in the city of Hamedan, the study results showed a significant increase in self-efficacy scores after the intervention in the experimental group (Moradi et al., 2017). These findings align with our results.

Similarly, Najafi Ghezeljeh et al. (2018) conducted a study with the aim of "comparing the effects of self-management education with telephone follow-up and mobile phone-based social network on blood pressure in patients with hypertension." Their study demonstrated a statistically significant difference in blood pressure among the groups after the intervention (Najafi Ghezeljeh et al., 2018).

Telephone follow-up has been found to improve patient satisfaction, reduce hospital readmissions, and increase adherence to medication and lifestyle recommendations (Arad et al., 2021). Social network follow-up has also been shown to improve patient outcomes, with studies suggesting that support from family and friends can reduce stress, improve mood, and enhance social functioning (Gohari et al., 2022; Gohari et al., 2021).

While both telephone and social network follow-up interventions aim to enhance self-efficacy and reduce depression, there is a need to compare their effectiveness to determine which intervention may yield better outcomes for patients undergoing CABG surgery. This comparison will provide valuable insights for healthcare professionals, enabling them to make informed decisions about the most appropriate intervention to enhance patients' self-efficacy levels and improve mental health outcomes. This study aims to investigate and compare the effect of telephone follow-up with social network follow-up on self-efficacy and depression in patients undergoing CABG surgery. By examining these two different follow-up interventions, this research aims to contribute to the existing body of knowledge on post-operative care and patient support. Additionally, the results of this study will help clinicians and healthcare providers make evidence-based decisions regarding the implementation of follow-up interventions that maximize patient outcomes and overall well-being.

Hypothesis:

1. Patients undergoing coronary artery bypass graft surgery who receive a telephone follow-up program will demonstrate a significant improvement in self-efficacy levels compared to those who receive a social network follow-up program.
2. Patients undergoing coronary artery bypass graft surgery who participate in a social network follow-up program will show a greater reduction in depression levels post-surgery compared to patients enrolled in a telephone follow-up program.
3. There will be a significant difference in self-efficacy levels between patients undergoing coronary artery bypass graft surgery who receive telephone follow-up and those who receive social network follow-up.

4. The impact of a telephone follow-up program on depression levels in patients after coronary artery bypass graft surgery will be comparable to that of a social network follow-up program in a randomized controlled trial setting.

2. Methodology

2.1. Study design & setting

This is a single-blinded, randomized controlled trial conducted from October 2022 to November 2022 in Shahid Rajaee Heart Hospital in Tehran, Iran. This study was assigned the registration code IRCT20220602055063N1 by the Iranian Registry of Clinical Trials on October 4, 2022.

2.2. Participants

The study's sample comprises patients who underwent coronary artery bypass grafting surgery at the Shahid Rajaee Heart Hospital in 2022 and met the inclusion criteria.

Considering the confidence interval of 95 % and the power of 80 % in the study by Zolfaghari et al. (2017) (Zolfaghari et al., 2017), the minimum sample size was calculated to be 90 using G*Power 3.1 (Faul et al., 2009). Regarding the attrition rate of 10 %, the final sample size was considered to be 99 ($n = 33$ per group).

$$\eta_1 = \frac{\left(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta}\right)^2 \left(\sigma_1^2 + \frac{\sigma_2^2}{k}\right)}{\Delta^2}, n_2 = k \times n_1$$

Inclusion criteria were composed of the followings: (a) willingness to participate in the study, (b) being literate, (c) being enough conscious and oriented to answer the questions, (d) having no history of hearing and vision impairments, (e) having no cognitive or depression disorders, (f) having a personal mobile phone and the ability to use it, (g) using no psychedelic drugs, (h) undergoing coronary artery bypass graft surgery, and (i) being in the 18–65 age group. Exclusion criteria consisted of (a) withdrawal from the study at any phase, (b) failure to receive two consecutive messages/calls, (c) patient death, and (d) being transferred to another health facility.

2.3. Data collection

Data were collected using a demographic questionnaire, the Sullivan's cardiac self-efficacy questionnaire, and the Beck Depression Inventory (BDI), which All patients completed the questionnaires in-person.

The demographic questionnaire consisted of items on age, gender, marital status, education, residency, and occupation.

2.3.1. Self-efficacy questionnaire

Sullivan's cardiac self-efficacy questionnaire is a self-report tool consisted of 16 items used to measure an individual's confidence or

belief in their ability to successfully manage their cardiac condition (Sullivan et al., 1998). The questionnaire is often used in clinical and research settings to assess a patient's self-efficacy, which can be an important predictor of health behaviors and outcomes. The questionnaire consists of a series of statements related to different aspects of cardiac self-management, such as medication adherence, exercise, diet, and stress management. Participants are asked to rate their confidence in their ability to perform each of these tasks on a scale, typically ranging from 0 (not confident at all) to 100 (completely confident). By completing the questionnaire, individuals can identify their areas of low self-efficacy and areas where they feel confident in their ability to manage their cardiac condition. This information can be used to tailor interventions and support strategies to improve self-efficacy and ultimately improve cardiac self-management. The overall score ranges from 0 to 64 and a higher score indicates higher levels of self-efficacy (Sullivan et al., 1998). The reliability and validity of Sullivan's cardiac self-efficacy questionnaire have been examined in several studies. In Iran, Shamsizadeh (2012) confirmed the reliability of the tool using Cronbach's alpha coefficient ($\alpha = 0.977$). Moreover, the test-retest reliability coefficient was calculated to be 0.85 (Shamsizadeh, 2012). O'Neil et al. (2013) also examined the content validity of the Sullivan's cardiac self-efficacy questionnaire through calculating the Content Validity Index (CVI = 0.99) (O'Neil et al., 2013). Test and re-test method was used to confirm the reliability of the questionnaire. Based on a general guideline (Altman, 1990), we asked 35 patients to complete the questionnaire. Then, they took another test in the same condition three days later. The scores obtained from the two tests were used to measure the correlation coefficient ($r = 0.91$) and the alpha ($a = 0.82$).

2.3.2. Depression questionnaire

The Beck Depression Inventory (BDI) is a commonly used self-report questionnaire designed to measure the presence and severity of depressive symptoms in individuals (Beck et al., 1987). Developed by psychologist Aaron T. Beck, the BDI is widely used in both clinical and research settings.

The questionnaire consists of 21 items, each composed of four statements reflecting varying levels of symptom severity. The individual taking the questionnaire is asked to choose the statement that best describes their feelings or experiences over the past two weeks. Each item is scored on a scale ranging from 0 to 3, with higher scores indicating greater symptom severity.

The BDI assesses a wide range of symptoms associated with depression, including sadness, guilt, pessimism, suicidal ideation, physical symptoms, and loss of interest in activities. The total score of the BDI is obtained by summing the scores of all 21 items. The score is then classified into different categories to indicate the severity of depressive symptoms, with higher scores correlating with greater severity (Beck et al., 1987).

The reliability and validity of the BDI have been extensively studied and established. The BDI demonstrates strong internal consistency, inter-rater reliability, and test-retest reliability. It has also been shown to have good convergent validity, meaning that it correlates with other measures of depression and psychological distress. In Iran, Mohammadkhani et al. (2020) confirmed the reliability of the tool using Cronbach's alpha coefficient ($\alpha = 0.93$) (Mohammadkhani et al., 2020). A method involving both initial testing and subsequent retesting was employed to ascertain the dependability of the questionnaire. Following a broadly accepted protocol outlined by Altman in 1990, we requested that 35 patients fill out the questionnaire. Subsequently, these same individuals were asked to take the test again under identical conditions after a three-day interval. The results from both test sessions were then analyzed to calculate the correlation coefficient ($r = 0.90$) and the alpha ($a = 0.80$), which provided insights into the questionnaire's reliability.

2.3.3. Method

Upon receiving approval from the Ethics Committee and Vice-Chancellor for Research of Tehran University of Medical Science, the researcher proceeded to the hospital where permission was sought from the relevant hospital officials. Subsequently, the study details were thoroughly explained to the head nurse of the associated wards. In this stage, convenience sampling was employed to select eligible patients, who were then invited to participate in the study. The researcher ensured that participants comprehended the study's objectives and methodology, addressing any concerns or queries they had. Additionally, all participants were assured of the strict maintenance of confidentiality and anonymity regarding their personal information. Finally, written informed consent was obtained either directly from the participants or from their legally authorized representatives. Subsequently, the patients were allocated to three groups of control ($n = 33$), telephone follow-up ($n = 33$), and WhatsApp follow-up using randomization.

2.3.4. Randomization

The study employed a random block randomization method with a block size of 6 to assign patients to three groups: telephone follow-up, follow-up through the social network platform WhatsApp, and a control group. A computer program was utilized to generate a randomization list, ensuring the allocation of participants across the groups was conducted in a randomized manner.

Random block randomization is a widely utilized technique in clinical trials to minimize bias and achieve comparability among treatment or control groups. By creating blocks of a fixed size and randomly assigning participants within each block, researchers aim to distribute potential confounding factors evenly across the groups.

Before the intervention, all patients filled in the demographic questionnaire, the Sullivan's cardiac self-efficacy questionnaire, and the Beck Depression Inventory (BDI). Data collection for each participant lasted about 25 min. Sampling was conducted from 9 September to 27 November 2022. Among 111 eligible patients, 6 patients declined to participate in the study, 3 patients did not meet the inclusion criteria, and 3 patients were transferred to another health facility due to underlying health conditions (Fig. 1).

2.3.5. Procedure

Patients in the intervention group were also asked to provide their contact information i.e., phone number (mobile/landline number). For each patient in the telephone follow-up group, a weekly 15-min phone call was made. During each phone call, the conversation included educational content related to the patient's required training during the discharge period. This training encompassed educational programs on medication, care, diet, and exercise. The medication program covered proper drug usage, while the care program focused on smoking cessation, pain control, surgical wound care, maintaining bowel movement balance, sleep status, vital sign monitoring, and recommendations for using incentive spirometry and proper use of medical belts. The dietary program addressed proper nutrition and suitable food choices, while the exercise program provided recommendations for activities tailored to the patient's medical and physical condition. This intervention was implemented for one month in the telephone follow-up intervention group. The researchers maintained fidelity to the programs in the telephone intervention group by implementing checklists or adherence forms. These documents were completed by the interventionists following each session to record the topics discussed and the degree to which the session aligned with the established protocol. This practice helped in monitoring and ensuring consistency in the delivery of the intervention.

In the intervention group (WhatsApp follow-up), a channel was established specifically for patients, and for a period of four weeks, predetermined educational messages were sent on a weekly basis. Before being added to the WhatsApp group, participants were informed about the process. Within two days of recruitment, they were included in the WhatsApp group. The group was facilitated by three trained peer counselors. Upon joining, participants received a welcome message that

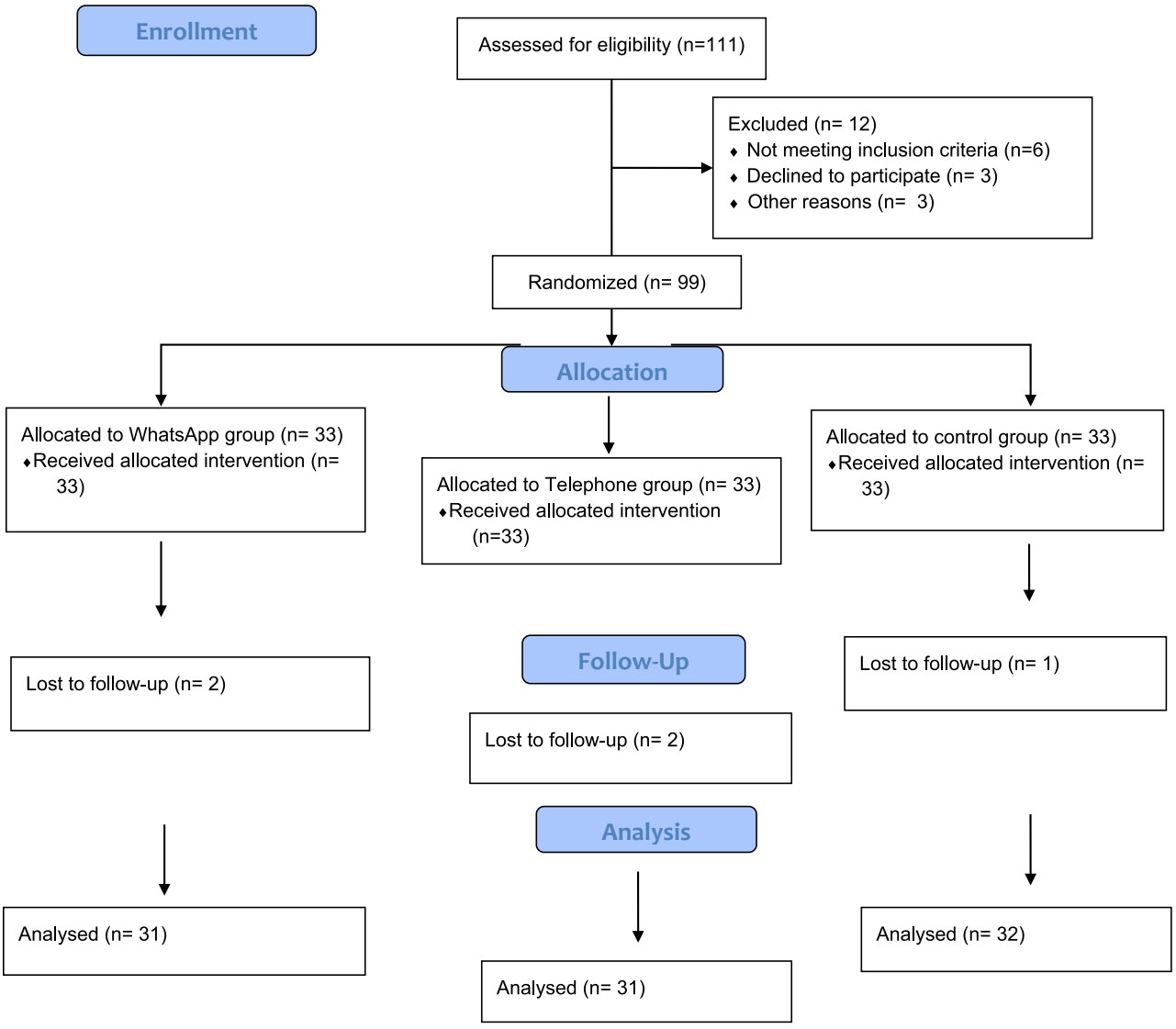

Fig. 1. Research flow diagram based on Consort statement.

introduced the peer counselors and encouraged open discussion and questions. This message also included educational content pertinent to the patient's post-discharge period, covering aspects such as medication, self-care, diet, and exercise routines. The program's details were shared with the patients through WhatsApp. All communications within the WhatsApp group were conducted in Farsi. The group was active for one hour daily, from 5 to 6 PM. To protect participants' privacy, they were advised to adjust their WhatsApp privacy settings and a set of participation rules was established. Due to the visibility of telephone numbers in WhatsApp groups and concerns about potential misconduct or harassment, as voiced by some female participants during pilot qualitative interviews, male and female participants were separated into different WhatsApp groups. Patients were able to communicate and send messages, with a limit of up to 6 messages per day within the group.

The control group only received routine follow-up and care from the center upon discharge, and no intervention was conducted for them during this one-month period. Routine care included education on medication usage, scheduling follow-up visits with the physician, performing dressings, and providing educational pamphlets to patients by nurses during the discharge process. After one month, the questionnaires were sent to the patients online, and upon completion, they were made available to the researcher. The CONSORT 2010 checklist was used to ensure quality reporting in the present study (22) (See Supplementary File).

2.4. Data analysis

The Kolmogorov–Smirnov test was used to examine the normality of data distribution. A researcher, who was blinded to the data, conducted the analysis. All data were entered into IBM SPSS Statistics for Windows, version 25.0 (IBM Corp., Armonk, N.Y., USA). Data were analyzed using descriptive and inferential statistics. In descriptive statistics, we used the frequency and percentage for analyzing qualitative variables and the mean and standard deviation for analyzing normal quantitative variables. In inferential statistics, we utilized the chi-squared ($\chi 2$) test and Fisher's exact test to assess the homogeneity of the groups. The one-way ANOVA was used to compare the data between the three groups. We also used the paired-samples *t*-test to compare the mean score within the groups.

3. Results

The results of the present study indicated that there was no statistically significant difference between the three groups in terms of gender, marital status, education, residency, occupation, and age ($p > 0.05$) (Table 1).

Table 1
Comparison of demographic characteristics of the patients in the study groups.

Variables		Groups			Results
		Control n[a] (%)	Telephone n (%)	WhatsApp n (%)	
Gender	Male	19 (59.3)	21 (67.7)	20 (64.5)	X = 0.686
	Female	13 (40.6)	10 (32.2)	11 (35.5)	*[b]P-value = 0.71
Education level	Primary	8 (25)	17 (54.8)	14 (45.1)	
	Secondary	16(50)	12 (38.7)	12 (38.7)	X = 7.399
	University	8 (25)	2 (6.4)	5 (16.1)	*P-value = 0.11
Marital status	Single	0 (0)	6 (19.3)	4(12.9)	
	Married	32 (100)	25 (80.6)	27(87.1)	**[c]P-value = 0.14
Occupation	Employed	12 (37.5)	13 (41.9)	10 (32.2)	
	Unemployed	8(25)	11 (35.4)	9 (29)	X = 0.9.350
	Retired	7 (21.8)	3 (9.6)	4 (12.9)	*P-value
	Inactive	5 (15.6)	4 (12.9)	8 (25.8)	= 0.14
Residual status	Rural	1 (3.1)	3 (9.6)	2 (6.4)	X = 1.402
	Urban	31 (96.8)	28 (90.3)	29(93.5)	*P-value = 0.60
Income level	Low	10 (31.2)	13 (41.9)	12 (38.7)	X = 8.345
	Medium	15 (46.8)	14(45.1)	13 (41.9)	*P-value = 0.192
	High	7 (21.8)	4 (12.9)	6 (19.3)	
Age		Control Mean ± SD[e] 61.35 ± 9.94	Telephone Mean ± SD 61.90 ± 7.16	WhatsApp Mean ± SD 60.14 ± 8.22	$t = 2.610$ ***[d]P-value = 0.82

[a] Number
[b] Chi-squared test
[c] **Fisher's exact test
[d] ***Independent sample *t*-test
[e] Standard deviation

The results revealed that there were no pre-treatment differences the mean self-efficacy score across the groups and there was no significant difference in the self-efficacy scores before and after the intervention in the control group. The statistical analysis ($P < 0.001$) indicates a significant improvement in self-efficacy scores following the intervention in the telephone follow-up group. Similarly, in the WhatsApp follow-up group, the mean self-efficacy score before the intervention was 19.10 ± 2.13. After the intervention, the mean score showed a significant increase to 42.35 ± 4.09. The statistical analysis ($P < 0.001$) suggests a significant improvement in self-efficacy scores following the intervention in the WhatsApp follow-up group. Additionally, based on Cohen's d effect size measurements, the differences in the mean scores of self-efficacy after the intervention compared to before were as follows: small for the control group (d = 0.11), medium for the Telephone group (d = 0.48), and large for the WhatsApp group (d = 0.86) (Table 2).

The results showed that there were no pre-treatment differences the mean depression score across the groups and there was no significant difference in the depression scores before and after the intervention in the control group. The statistical analysis ($P < 0.001$) indicates a highly significant reduction in depression scores following the intervention in the telephone follow-up group. Similarly, in the WhatsApp follow-up group, the mean depression score before the intervention was 14.45 ± 2.32. After the intervention, the mean score showed a significant decrease to 9.20 ± 1.23. The statistical analysis ($P < 0.001$) suggests a highly significant reduction in depression scores following the intervention in the WhatsApp follow-up group. Additionally, based on Cohen's d effect size measurements, the differences in the mean scores of depression after the intervention compared to before were as follows: small for the control group (d = 1.08), large for the Telephone group (d = 0.48), and large for the WhatsApp group (d = 1.06) (Table 3).

Pairwise comparisons using the Bonferroni correction test showed that both telephone and WhatsApp follow-up groups showed significant improvement in self-efficacy and reduction in depression scores compared to the control group after the intervention. However, the telephone follow-up group generally had higher self-efficacy and lower depression scores compared to the WhatsApp follow-up group. These findings highlight the effectiveness of both interventions in improving patient outcomes. Moreover, the mean self-efficacy score was higher and in the mean depression score was lower in the WhatsApp follow-up group than that in telephone follow-up group after the intervention (Table 4).

4. Discussion

This study aimed to compare the effect of telephone follow-up with social network follow-up programs on self-efficacy and depression in patients undergoing coronary artery bypass graft (CABG) surgery. The study findings provide valuable insights into the effectiveness of these interventions and their potential implications for postoperative care in this patient population.

The results of our study revealed significant improvements in self-efficacy and depression outcomes among patients who received both telephone and social network follow-up interventions when compared to the control group. The provision of regular follow-up and support, whether through telephone calls or social networking platforms, appears to play a crucial role in promoting positive psychological outcomes.

In terms of self-efficacy, both telephone and social network follow-up interventions demonstrated significant improvements compared to the control group. Patients in the intervention groups reported higher levels of self-efficacy, indicating an increased belief in their ability to manage their condition and cope with the challenges associated with CABG surgery. This improvement in self-efficacy can have important implications for patients' engagement in self-care behaviors, adherence to medication and lifestyle modifications, and overall adjustment to life after surgery.

In line with the results of our study, Bani Ardalan et al. (2022) indicated no significant difference in the average self-efficacy scores between the control group before and after the intervention. However, there was a statistically significant difference in the average self-efficacy

Table 2
Comparison of the mean self-efficacy score of the patients in the study groups.

variable	Groups	N	Before the intervention	After the intervention	Results	Effect size (Cohen's d)
			Mean ± SD	Mean ± SD		
Self-efficacy	Control	32	21.15 ± 2.46	21.60 ± 2.38	*[a]$P = 0.87$	0.01
	Telephone	31	21.86 ± 2.98	38.62 ± 3.86	*P < 0.001	0.48
	WhatsApp	31	19.10 ± 2.13	42.35 ± 4.09	*$P < 0.001$	0.86
	Results		**[b]$P = 0.21$	**P < 0.001	–	–

[a] *Paired sample *t*-test
[b] ** one way ANOVA

Table 3
Comparison of the mean depression score of the patients in the study groups.

variable	Groups	N	Before the intervention	After the intervention	Results	Effect size (Cohen's d)
			Mean ± SD	Mean ± SD		
Depression	Control	32	14.15 ± 2.35	14.55 ± 1.81	*[a]$P = 0.63$	0.09
	Telephone	31	15.29 ± 2.13	9.14 ± 1.92	*P < 0.001	1.08
	WhatsApp	31	14.45 ± 2.32	9.20 ± 1.23	*P < 0.001	1.06
Results			**[b]$P = 0.14$	**P < 0.001	–	–

[a] *Paired sample *t*-test
[b] ** one way ANOVA

Table 4
Binary comparisons after the intervention.

Variables	Group A	Group B	The mean difference (B-A)	P-value
Self-efficacy	Control group	Telephone	15.10000	*[a]$P <$ 0.001
		WhatsApp	6.92800	*P < 0.001
	Telephone	WhatsApp	- 8.17200	*P < 0.001
Depression	Control group	Telephone	13.12000	*P < 0.001
		WhatsApp	7.94500	*P < 0.001
	Telephone	WhatsApp	- 6.26200	*P < 0.001

[a] *Bonferroni pairwise comparison

scores before the intervention among the three groups, indicating differences between the telephone follow-up group and the discharge planning group. After the intervention, there was also a statistically significant difference in the average self-efficacy scores among the three groups, suggesting differences between the control group and the telephone follow-up groups, as well as between the telephone follow-up and discharge planning groups. However, there was no statistically significant difference between the control group and the discharge planning group. Overall, considering that telephone follow-up by nurses resulted in a greater difference in average self-efficacy scores compared to the control group, it demonstrates the greater effectiveness of telephone follow-up in enhancing the self-efficacy of caregivers of stroke patients (Bani Ardalan et al., 2022).

Furthermore, in the study conducted by Moradi et al. (2017) showed a significant increase in self-efficacy scores after the intervention in the experimental group (Moradi et al., 2017). These findings align with our results.

Similarly, Najafi Ghezeljeh et al. (2018) demonstrated a statistically significant difference in blood pressure among the groups after the intervention. Based on the findings, self-management education with telephone follow-up or mobile phone-based social network is effective in controlling blood pressure in patients with hypertension, which is consistent with our study (Najafi Ghezeljeh et al., 2018).

Mohammadpourhodki et al. (2018) also conducted a study with the aim of "determining the effect of education and telephone follow-up by nurses on self-efficacy in diabetes management in patients with type 2 diabetes." The research findings indicated that the mean self-efficacy score in diabetes management did not show a statistically significant difference between the two groups before the intervention. However, after providing education to the intervention group, the mean self-efficacy score in diabetes management significantly improved compared to the control group at one and two months later, which is consistent with the results of our study (Mohammadpourhodki et al., 2018).

Regarding depression outcomes, both intervention groups exhibited significant reductions in depression scores compared to the control group. This suggests that the provision of follow-up support, whether through telephone or social network, can effectively mitigate depressive symptoms in patients undergoing CABG surgery. Depression is a common psychological concern in this patient population, and addressing it early in the postoperative period can contribute to better psychological well-being, improved quality of life, and enhanced overall recovery.

Zolfaghari et al. (2017) carried out a study to assess the effect of telephone follow-up care on the rates of readmission and depression among patients who had undergone open-heart surgery in selected hospitals in Ahvaz. The Beck Depression Inventory questionnaire was used as the tool in this research. The results of the independent *t*-test demonstrated a statistically significant difference in the average depression scores between the experimental and control groups after the intervention. Telephone follow-up care led to a reduction in short-term postoperative depression and readmission rates in these patients (Zolfaghari et al., 2017), which is consistent with the findings of the present study.

Similarly, Ehde et al. (2015) performed a study to evaluate the impact of a telephone-based self-management intervention on fatigue, pain, and depression in adults with multiple sclerosis (MS) in the United States. Their study results showed that 58 % of the intervention group participants via telephone and 46 % of the participants in the video-based intervention group experienced a reduction in one or more symptoms, but this difference was not statistically significant. Participants in the telephone intervention group reported higher treatment satisfaction and adherence. The overall results of the study indicated that both interventions resulted in short-term and long-term benefits and had clinically significant implications. This study demonstrated the usefulness of intervention and telephone follow-up in engaging participants in care and enhancing rehabilitation for individuals with multiple sclerosis (Ehde et al., 2015), which is in line with our study.

Furthermore, Mohr et al. (2011) conducted a study to compare the effectiveness of telephone follow-up with face-to-face cognitive-behavioral therapy in treating depressed outpatients in Chicago, USA. The results indicated that both treatment approaches showed significant improvement in depression among the patients. Additionally, there was a significant difference in treatment outcome favoring telephone follow-up compared to face-to-face treatment. Participants receiving the intervention through face-to-face therapy were significantly more depressed than those receiving telephone follow-up and intervention. The overall results of this study demonstrated that among patients with depression, providing therapy and follow-up via telephone resulted in lower attrition and improved depression outcomes compared to face-to-face treatment (Mohr et al., 2011), which is consistent with the findings of our study.

When comparing the two intervention modalities, telephone follow-up and social network follow-up, some interesting patterns emerged. The results revealed significant improvements in self-efficacy and reductions in depression scores for both the telephone and WhatsApp follow-up groups compared to the control group following the intervention. However, it is noteworthy that the telephone follow-up group generally exhibited higher levels of self-efficacy and lower depression scores compared to the WhatsApp follow-up group. These findings underscore the effectiveness of both interventions in enhancing patient outcomes. Additionally, the mean self-efficacy score was higher and the

mean depression score was lower in the WhatsApp follow-up group than in the telephone follow-up group after the intervention. These results suggest that the WhatsApp follow-up method may have certain advantages over telephone follow-up in terms of self-efficacy and depression reduction. Additionally, the familiarity and accessibility of the telephone, particularly among less technologically adept individuals, could contribute to the effectiveness of telephone follow-ups. The privacy and structure of one-on-one calls may also encourage more open discussions about sensitive health issues. Lastly, the timing and frequency of interactions, which might be more consistent and reliable in scheduled telephone calls, could play a role. Understanding these factors is crucial for tailoring remote healthcare interventions to the needs of diverse populations. The study found that telephone and social network follow-ups improved self-efficacy and reduced depression in patients after CABG surgery, with telephone follow-ups being particularly effective against depression. The authors recommend incorporating these interventions into postoperative care to enhance patient well-being and recovery. They also call for further research into combining technology-based interventions with traditional care for comprehensive support.

The present study has several limitations that should be acknowledged. Firstly, the sample size was relatively small, which may limit the generalizability of the findings to a larger population. A larger sample size would have provided greater statistical power and increased the robustness of the results. Secondly, the study focused specifically on patients undergoing coronary artery bypass graft surgery, which may restrict the applicability of the findings to other surgical populations or medical conditions. Future research should consider including a more diverse range of surgical procedures and patient populations to enhance the external validity of the study. Additionally, the study only compared telephone follow-up with social network follow-up (specifically WhatsApp), and did not include other forms of social media or digital platforms. This may limit the understanding of the potential differences and effectiveness of various social network follow-up methods. Moreover, the study relied on self-report measures for assessing self-efficacy and depression, which are subject to potential biases and inaccuracies. The inclusion of objective measures or clinician ratings could have provided a more comprehensive assessment of these outcomes. Finally, the duration of follow-up in the study was relatively short-term, and it remains unclear how the effects of the interventions may change over longer periods of time. Future studies should consider longer follow-up periods to evaluate the sustainability of the observed improvements in self-efficacy and depression. Future research might explore patient preferences between telephone and WhatsApp for follow-ups, assess satisfaction levels with different follow-up methods, and investigate outcomes extending beyond the first month.

5. Conclusion

In conclusion, this randomized controlled trial demonstrated the effectiveness of both telephone and social network follow-up interventions in improving self-efficacy and reducing depression in patients undergoing CABG surgery. These findings highlight the importance of postoperative support programs in promoting positive psychological outcomes. While both interventions showed benefits, telephone follow-up appeared to have a more pronounced effect on reducing depressive symptoms. Healthcare providers should consider incorporating such interventions into routine postoperative care to enhance patient well-being and facilitate successful recovery after CABG surgery. Further research is warranted to explore the optimal combination and integration of technology-based interventions with traditional care approaches to provide comprehensive support to cardiac surgery patients.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Ethics approval and consent to participate

The ethics committee of Tehran University of Medical Sciences approved the study (Ethical code: IR.RHC.REC.1401.041). This study was registered in the Iranian Registry of Clinical Trials (Registration code: IRCT20220602055063N1). The participants were fully informed about the purpose of the study. Each participant provided written consent prior to participation. They were explained regarding their voluntary nature of participation and that they can stop cooperation at any given time. They also assured about their privacy and confidentiality of their information.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.invent.2024.100757.

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