Jurnal Ners

Volume 21 Issue 2, May 2026, p. 235-244
http://dx.doi.org/10.20473/jn.v21i2.83316

Original Article

Open Access

Effect of a telenursing educational intervention on knowledge and self-care management among patients after CABG: A quasi-experimental study

Shaimaa Ibrahim Abdelaty Farag[1]*, Shalabia Elsayed Abozead[2], Hala Mohamed Ghanem[3], and Hussein Elkhayat[4]

[1] Nursing Specialist at Heart Hospital, Assiut University, Assiut, Egypt

[2] Professor of Medical Surgical Nursing, Faculty of Nursing, Assiut University, Assiut, Egypt

[3] Assistant Professor of Medical Surgical Nursing, Faculty of Nursing, Assiut University, Assiut, Egypt

[4] Professor of Cardio-Thoracic Surgery, Faculty of Medicine, Assiut University, Assiut, Egypt

*Correspondence: Shaimaa Ibrahim Abdelaty Farag. Address: Nursing Specialist at Heart Hospital, Assiut University, Assiut, Egypt. Email: shimaaebrahim0162@nursing.aun.edu.eg

Responsible Editor: Ferry Efendi

Received: 5 December 2025○ Revised: 11 April 2026 ○ Accepted: 30 May 2026

ABSTRACT

Introduction: Coronary artery bypass grafting (CABG) remains a cornerstone intervention in the management of progressive coronary artery disease; however, insufficient post-discharge self-care may lead to complications, delayed healing, and hospital readmissions. Telenursing has emerged as a promising strategy for supporting patients during early recovery. This study aimed to evaluate the effect of a structured telenursing educational intervention on patients' knowledge and self-care management during early follow-up after CABG.

Methods: A quasi-experimental study was conducted on 114 patients undergoing first-time elective CABG at Assiut University Heart Hospital. Participants were divided into intervention (n = 57) and control (n = 57) groups. Data were collected using a structured knowledge interview questionnaire and validated self-care management scale. Statistical analyses included paired t-tests, independent t-tests, repeated measures ANOVA, chi-square test, and Pearson correlation analysis.

Results: The intervention group demonstrated significant improvement in knowledge and self-care management scores one month after discharge compared to baseline and the control group ($p < 0.001$). A significant positive correlation was observed between patients' knowledge and self-care management ($r = 0.804$, $p < 0.001$).

Conclusions: Telenursing intervention was associated with enhanced patient knowledge and self-care management during the early follow-up after CABG. The integration of structured telenursing follow-up into routine nursing care is recommended to support safe recovery and promote patient independence.

Keywords: CABG, self-care management, telenursing

Introduction

Coronary artery disease (CAD) is a major global health concern characterized by narrowing or obstruction of the coronary arteries resulting from plaque buildup, which restricts blood flow to the cardiac muscle (WHO, 2025). In 2021, ischemic heart disease was responsible for approximately nine million fatalities worldwide, establishing it as the leading cause of death globally (WHO, 2025). Coronary artery bypass grafting (CABG) is a central intervention in the management of CAD, particularly in patients with significant stenosis, multivessel disease, or left main coronary involvement (Ghandakly et al., 2024). CABG has demonstrated superior long-term outcomes, particularly in patients with diabetes mellitus and complex multivessel disease, by reducing the rates of major adverse cardiovascular events (Ghandakly et al., 2024).

Despite surgical success, the early post-discharge period remains a vulnerable phase for patients (Ariyanti *et al.*, 2025; Hariyono *et al.*, 2025; Supriyanto, Nasronudin

and Supriyanto, 2026). Following discharge, a considerable proportion of patients experience postoperative difficulties, such as fatigue, pain, sleep disturbances, emotional distress, and reduced functional capacity. These challenges interfere with patients' ability to adhere to rehabilitation programs, medication regimens, lifestyle modifications, and self-care practices, thereby increasing the risk of complications and hospital readmissions (Panzeri et al., 2025; Mohebi et al., 2025).

Therefore, effective self-care management is essential following CABG (Muliantino *et al.*, 2024; Marti *et al.*, 2025; Siahaan *et al.*, 2025; Wahyuningsih *et al.*, 2025). Proper self-care practices facilitate enhanced healing, lower morbidity, higher quality of life, and reduced healthcare costs. Nurses play a pivotal role in facilitating patients' transition from hospital to home by delivering education, monitoring healing, and enhancing self-management abilities (Setyowati *et al.*, 2024).

Recent advancements in telehealth have expanded the opportunities for telenursing follow-ups. Telenursing facilitates continuous support, education, and early identification of complications. Digital health solutions, including mobile applications and web-based platforms, have demonstrated the capacity to improve patient engagement, symptom recognition, and postoperative recovery in cardiac patients (Bikmoradi et al., 2023; Wu et al., 2023).

Nonetheless, current telehealth initiatives frequently depend on single communication modalities or focus primarily on long-term cardiac rehabilitation rather than the immediate postoperative recovery period. Evidence regarding structured, multimodal telenursing interventions that combine synchronous and asynchronous communication methods remains limited, particularly in the context of early recovery following CABG (Maleki et al., 2023; Ariyanto & Rosa, 2024; Hojjati & Pour, 2025).

The novelty of the present study lies in integrating structured pre-discharge education with scheduled post-discharge telenursing follow-up using a combination of telephone calls and WhatsApp communication. This approach provides continuous, accessible nursing support suitable for healthcare settings with limited digital infrastructure, while targeting the critical first month after surgery, when the risk of complications is the highest. Although previous research has examined digital messaging for CABG transitional care, evidence regarding its integration with supportive nurse follow-up is limited (Center *et al.*, 2025).

Therefore, this study aimed to evaluate the effect of telenursing interventions on patients' knowledge and self-care management during the early follow-up period after CABG. It was hypothesized that patients receiving the telenursing intervention would demonstrate significantly higher knowledge and self-care management levels than those receiving standard care.

Materials and Methods

Study design and setting

A quasi-experimental design, including intervention and control groups, was employed over an eight-month period from January 2025 to August 2025, enabling a systematic comparison of outcomes between patients receiving telenursing intervention and those receiving standard care. The research was conducted within the cardiothoracic surgery department at Assiut University Heart Hospital, a specialized clinical setting that provided access to patients undergoing CABG and facilitated structured follow-up during the early discharge phase.

Variables

In this study, the independent variable was the structured telenursing intervention specifically designed for patients undergoing CABG, whereas the dependent variables were the patients' knowledge and self-care management outcomes.

Sample Size and Sampling Technique

The required sample size for this study was determined based on the total patient population of 160 individuals admitted to the Cardio-Thoracic Surgery Department at Assiut University Heart Hospital during 2024, applying standard parameters of a 95% confidence level, margin of error of 5%, and population proportion of 0.50, in accordance with Thompson (2012). This calculation yielded a minimum sample size of 110 participants, and to account for potential attrition of approximately 5%, 114 patients were recruited. A post hoc power analysis confirmed that this sample size provided greater than 80% statistical power to detect a medium effect size (Cohen's $d \geq 0.5$) at $\alpha = 0.05$. A purposive sampling technique was employed, whereby eligible patients admitted for first-time elective CABG during the data collection period were approached consecutively and invited to participate.

Inclusion criteria

Eligible participants were adult patients aged 20–60 years who underwent first-time elective CABG. Participants were required to be conscious, oriented, medically stable, able to communicate and follow instructions, and willing to participate in the study. Patient vigilance and cooperation were assessed using the patients' cognitive status and willingness to participate during the pre-discharge phase. Additionally, all participants were required to have access to telecommunication devices.

Data collection tools

Data were collected using two main instruments:

Tool I: Patients' Interview Questionnaire

This instrument was designed to assess patients' personal characteristics, medical history, complications, knowledge, and self-care management. It consists of five parts:

Part 1: Personal Characteristics

The questionnaire included age, sex, marital status, residence, level of education, occupation, health habits, previous exposure to educational information about CABG, and post-discharge care.

Part 2: Medical History

It assessed patients past medical history, type of operation, incisional approach, graft number, intensive care unit (ICU) days spent, and graft type.

Part 3: Postoperative Complications

Postoperative complications were assessed using a structured checklist covering respiratory, cardiovascular, gastrointestinal, incisional or graft site, neurological, psychological, social, sleep-related, and other general complaints. Data were collected through standardized, face-to-face interviews.

Part 4: Patients' Knowledge Assessment (Pre/Post Test)

This section was formulated by the researcher following a survey of the pertinent literature Said et al. (2022); Urden et al. (2024); Ignatavicius et al. (2025). The questionnaire consisted of 46 items divided into two sections:

Section A: Knowledge related to coronary artery disease, risk factors, signs and symptoms, CABG procedures, purpose, contraindications and risks (16 items)

Section B: Knowledge related to post-discharge self-care management, including incisional care, respiratory exercises, medication adherence, physical activity, diet, psychological adaptation, and lifestyle modification (30 items)

Scoring system: Each correct response received one point, and incorrect responses scored zero. Two extended questions were scored from 0 to 2. The total score ranged from 0 to 46.

In this study, patients' knowledge was evaluated using a structured scoring system with clearly defined cutoff values. Knowledge was classified according to the percentage of achievement. A score greater than 50% of the total score was considered indicative of satisfactory knowledge, reflecting an adequate understanding of CABG and self-care management practices. Conversely, a score equal to or less than 50% was categorized as unsatisfactory knowledge, signifying limited comprehension of the essential information required for effective, postoperative recovery (Phukan and Phukan, 2023). This classification provides a standardized benchmark for distinguishing between patients who are adequately prepared for self-care and those who require further educational support.

Part 5: Self-Care Management Assessment Scale

Self-care management was measured using the scale developed by Abdelatief et al. (2019), consisting of 30 items assessing the physical, psychological, and social self-care domains.

Scoring system: Each item began with the statement, "How confident are you that you know or can," and was concerned with the assessment of patients' self-care management in the physical, social, and psychological domains. Responses were rated on a three-level Likert scale from 1= not at all confident, 2= moderately confident, to 3= completely confident, yielding a total possible score between 30 and 90, with higher scores indicating greater self-care management ability. For statistical analysis and to facilitate comparability across participants, total scores were transformed into mean item scores by dividing the overall score by the number of items. Accordingly, the reported values ranged from one to three. Based on this transformation, self-care management levels were categorized as low (mean score < 2.0), moderate (mean score 2.0–2.5), and high (mean score > 2.5). This standardized approach ensured consistency between the scoring method and the reported results, particularly in Tables 4 and 5, and minimized the potential misinterpretation of the findings.

Tool II: Telenursing Intervention

This instrument was designed by the investigator based on the assessment of patients' knowledge based on current clinical guidelines for post-CABG care and recent evidence on telehealth-based nursing follow-up. It was designed in Arabic with graphics and a straightforward language. The intervention consisted of two phases.

Phase 1. Pre-Discharge Education

Prior to discharge, patients in the intervention group received structured face-to-face education delivered by the researcher (a trained medical–surgical nurse specialist with more than five years of clinical experience in cardiothoracic care). Education was conducted in five sessions (20-30 minutes each) in small groups (2-3 patients). The teaching methods included discussions, verbal explanations, and demonstrations. At the end of the sessions, written self-care management instructions were provided to the participants. The educational content covered coronary artery disease overview, CABG information, incisional care and edema prevention, respiratory complications and pain management, physical activity and medication adherence, lifestyle

modification and warning signs, and practical self-care management skills.

Phase 2. Post-Discharge Telenursing Follow-Up

After discharge, participants received structured telenursing follow-up for one month, including telephone calls twice weekly (10–15 minutes per call), WhatsApp messages twice weekly, and digital educational materials. Follow-up focused on monitoring, reinforcement of education, medication adherence, psychological support and early detection. All follow-up sessions were conducted by the researcher to ensure consistency and to reduce intervention variability. The control group received routine discharge instructions consisting of medication instructions, wound care guidance, activity recommendations, and follow-up appointment information provided by ward nurses before discharge only, without a structured telenursing follow-up.

Tools Validity and Reliability

Face and content validity were established by a panel of five experts in cardiothoracic surgery and medical–surgical nursing specialties. The experts evaluated the instruments for clarity, relevance, comprehensiveness, and appropriateness of the wording. Content validity was quantified using the Content Validity Index (CVI). The Item-Level CVI (I-CVI) ranged from 0.80 to 1.00, and the Scale-Level CVI (S-CVI/Ave) was 0.92, indicating excellent overall content validity of the scale. Items with I-CVI < 0.78 were revised. Internal consistency reliability was assessed using Cronbach's alpha. The overall alpha was 0.78, with subscale alphas ranging from 0.75–0.81, indicating satisfactory reliability.

Ethical Considerations

Ethical approval was granted by the Institutional Review Board of the Faculty of Nursing, Assiut University, Egypt (Approval No. 329021; approval date: November 25, 2021). Data collection commenced in 2025 following confirmation that ethical approval remained valid and all procedures were consistent with the approved protocol. This study complied with the guidelines of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to their participation. Confidentiality and anonymity were completely respected, and participants were assured of their right to withdraw at any time without penalty.

Data analysis

Data were analyzed using SPSS (version 23). The normality of all continuous variables was assessed using the Shapiro–Wilk test. Since the data were normally distributed ($p > 0.05$), parametric tests were applied. Continuous variables are expressed as means ± SD, and categorical variables as frequencies and percentages. Baseline equivalence between the intervention and control groups was evaluated using an independent-samples t-test for continuous variables and a chi-square test for categorical variables. Within-group (pre-post) comparisons were conducted using paired t-tests, and between-group differences were assessed using independent t-tests. To examine the intervention effect over time, repeated measures ANOVA was performed to assess the interaction between time (pre- and post-intervention) and group (intervention vs. control). The Pearson correlation coefficient was used to examine the relationship between knowledge and self-care management scores. Statistical significance was set at $p < 0.05$. Effect sizes were calculated (Cohen's d for t-tests, partial eta squared η^2 for ANOVA), and all results were reported with 95% confidence intervals (CI). Statistical significance was set at $p < 0.05$.

Results

Patients' personal characteristics

Table 1 presents a comparison of the personal characteristics of the study and control groups. The mean age did not differ significantly between the groups (study: 54.98 ± 5.89 years; control: 53.07 ± 6.26 years; $t = 1.680$, $p = 0.096$). Male participants represented 91.2% of both groups ($\chi^2 = 0.000$, $p = 1.000$). No statistically significant differences were observed in terms of marital status ($\chi^2 = 4.000$, $p = 0.261$), residence ($\chi^2 = 0.603$, $p = 0.561$), educational level ($\chi^2 = 5.158$, $p = 0.271$), or occupation ($\chi^2 = 1.282$, $p = 0.733$). Smoking status differed between the groups ($\chi^2 = 6.978$, $p = 0.031$). Prior educational exposure to CABG and early self-care instructions was reported by 7.0% of the intervention group and 8.8% of the control group ($\chi^2 = 0.121$, $p = 1.000$). Among those with prior information, the distribution of information sources did not differ significantly ($\chi^2 = 1.667$, $p = 0.644$).

Patients' medical history

Table 2 shows the distribution of medical history and operative characteristics of the patients. Hypertension was more prevalent in the control group ($\chi^2 = 8.924$, $p = 0.003$), whereas diabetes mellitus was more common in the intervention group ($\chi^2 = 5.022$, $p = 0.025$). No significant differences were found for hyperlipidemia ($\chi^2 = 0.143$, $p = 0.706$). Myocardial infarction was more frequently reported in the control group ($\chi^2 = 7.747$, $p = 0.005$). The type of operation and surgical approach did not differ significantly between the groups ($p > 0.05$). Graft type also showed no statistically significant variation ($\chi^2 = 1.886$, $p = 0.390$).

Patients' complications after CABG

Table 3 presents the statistically significant differences in several postoperative complications at one month after surgery. The intervention group reported

Table 1. Frequency and distribution of patients' personal characteristics among study and control group (n=114).

Patients' personal characteristics	Study (n=57) n (%)	Control (n=57) n (%)	Test Value	p-value
Age (years)			t = 1.680	0.096
Mean ± SD	54.98± 5.89	53.07 ±6.26		
Sex			χ^2 = 0.000	1.000
Male	52 (91.2)	52 (91.2)		
Female	5 (8.8)	5 (8.8)		
Marital status			χ^2 = 4.000	0.261
Single	2 (3.5)	0 (0.0)		
Married	55 (96.5)	55 (96.5)		
Divorced	0 (0.0)	1 (1.8)		
Widow	0 (0.0)	1 (1.8)		
Residence			χ^2 =0.603	0.561
Urban	23 (40.4)	19 (33.3)		
Rural	34 (59.6)	38 (66.7)		
Level of education			χ^2 = 5.158	0.271
Illiterate	10 (17.5)	4 (7.0)		
Read and write	0 (0.0)	2 (3.5)		
Basic education	4 (7.0)	6 (10.5)		
Secondary education	28 (49.1)	31 (54.4)		
University education	15 (26.3)	14 (24.6)		
Level of occupation			χ^2 = 1.282	0.733
Employee	31 (54.4)	33 (57.9)		
Farmer	2 (3.5)	4 (7.0)		
Housewife	2 (3.5)	1 (1.8)		
Not working	22 (38.6)	19 (33.3)		
Smoking Status			χ^2 = 6.978	0.031
Smoking	11 (19.3)	22 (38.6)		
Never Smoking	17 (29.8)	8 (14.0)		
Ex-Smoker	29 (50.9)	27 (47.4)		
Patients' previous educational information:	4 (7.0)	5 (8.8%)	χ^2 =0.121	1.000
Source of information*			χ^2 =1.667	0.644
Mass media	2 (20.0)	2 (20.0)		
Health care professional	1 (10.0)	1 (10.0)		
Social media	0 (0.0)	1 (10.0)		
Friends and relatives	1 (10.0)	1(10.0)		

Note. Data are presented as mean ± standard deviation (SD) for continuous variables and numbers (percentages) for categorical variables. An independent sample t-test was used for age. The chi-square (χ^2) test was used for categorical variables. Statistical significance was set at $p < 0.05$.
*Source of information calculated among participants who reported previous educational information.

lower frequencies of dyspnea ($p = 0.005$), atelectasis ($p = 0.009$), pneumonia ($p = 0.041$), constipation ($p < 0.001$), poor appetite ($p < 0.001$), vomiting ($p = 0.012$), chest wound infection ($p = 0.001$), fatigue ($p < 0.001$), psychological fear ($p = 0.017$), and difficulty in falling asleep ($p < 0.001$). However, leg wound infection was significantly higher in the intervention group (8.8%) than in the control group (0.0%) ($p < 0.001$).

Assessment of patients' knowledge (pre/post)

Figure 1 shows the significant differences between groups in total knowledge scores before and one month after the telenursing intervention ($p < 0.001$).

Patients' self-care management assessment scale

Figure 2 demonstrates significant variations in the total mean scores of self-care management (physical, social, and psychological) before and one month after the telenursing intervention ($p < 0.001$).

Relations

Figure 3 reveals significant correlations between knowledge and self-care management in the intervention group at baseline and at one-month follow-up ($p < 0.001$).

Table 4 shows no statistically significant difference in scores between educational levels before the intervention ($F = 2.64$, $p = 0.059$). However, a statistically significant difference was observed after one month ($F = 3.049$, $p = 0.036$).

Table 2. Baseline Medical History and Operative Characteristics of Study and Control Groups (n = 114)

Variable	Study (n = 57) n (%)	Control (n=57) n (%)	X2	p-value
Past medical history:				
Hypertension	31 (54.4)	46 (80.7)	8.924	0.003
Diabetes Mellitus	33 (57.9)	21 (36.8)	5.022	0.025
Hyperlipidemia	34 (59.6)	32 (56.1)	0.143	0.706
Myocardial infarction	8 (14.0)	21 (36.8)	7.747	0.005
Type of operation:				
On pump	57(100)	56 (98.2)	1.000	0.317
Off pump	0 (0)	1 (1.8)		
Incisional approach:				
Median sternotomy	57 (100.0)	56 (98.2)	1.000	0.317
Minimal invasive	0 (0)	1 (1.8)		
Graft type:				
Internal thoracic mammary artery	4 (7.0)	1 (1.8)	1.886	0.390
Radial artery	2 (3.5)	2 (3.5)		
Greater saphenous vein	51 (89.5)	54 (94.7)		

Note. Values are presented as numbers (percentages). Group comparisons were performed using the chi-square (χ^2) test. Statistical significance was set at $p < 0.05$.

Table 3. Comparison of postoperative complications at one month after telenursing intervention (n = 114)

Complication	Study (n=57) n (%)	Control (n=57) n (%)
Respiratory System		
Dyspnea	0 (0.0)	8 (14.0)
Atelectasis	1 (1.8)	9 (15.8)
Pneumonia	1 (1.8)	7 (12.3)
Gastrointestinal System		
Constipation	1 (1.8)	15 (26.3)
Poor appetite	1 (1.8)	23 (40.4)
Vomiting	0 (0.0)	6 (10.5)
Incisional Complications		
Leg wound infection	5 (8.8)	0 (0.0)
Chest wound infection	0 (0.0)	3 (5.3)
Neurological		
Fatigue	0 (0.0)	20 (35.1)
Psychological		
Fear	0 (0.0)	4 (7.0)
Sleep Disturbance		
Difficulty falling asleep	0 (0.0)	7 (12.3)

Note: Values are expressed as n (%). Baseline homogeneity between groups was tested using the chi-square test or Fisher's exact test, as appropriate. Post-intervention comparisons between the study and control groups were analyzed using the Chi-square or Fisher's exact test.

Table 4. Self-Care Management Mean Score Differences of Educational Level Pre- and Post-Intervention (n=57)

Variables	Mean Item Score ± SD	F	p-value
	Before Intervention		
University education and above	18.53 ± 8.90	2.64	0.059
Secondary education	17.79 ± 7.75		
Basic education	7.25 ± 8.10		
Illiterate	19.20 ± 4.71		
	After One Month		
University education and above	58.80 ± 2.51		
Secondary education	58.43 ± 2.46	3.05	0.036
Basic education	55.00 ± 2.58		
Illiterate	58.90 ± 1.66		

Note. Mean Item Score ± SD; F = ANOVA test value; P = significance level; *P < 0.05 = statistically significant.

Table 5. Self-Care Management Mean Score Differences of Occupational Status Pre- and Post-Intervention (n=57)

Occupational Status	Mean Item Score ± SD	F	p-value
	Before Intervention		
Employee	15.90 ± 8.51	3.45	0.023
Farmer	6.00 ± 11.31		
House wife	17.00 ± 2.82		
Not working	20.81± 5.76		
	After One Month		
Employee	57.87 ± 2.70	3.04	0.037
Farmer	55.00 ± 4.24		
House wife	59.00 ± 1.41		
Not working	59.32 ± 1.64		

Note. Mean Item Score ± SD; F = ANOVA test value; P = significance level; *P < 0.05 = statistically significant.

Table 5 reveals statistically significant differences in baseline scores across occupational groups (F = 3.45, p = 0.023).

Discussions

The present study examined the effect of telenursing intervention on patients' knowledge and self-care management following CABG. Our initial hypothesis proposed that the application of telenursing intervention

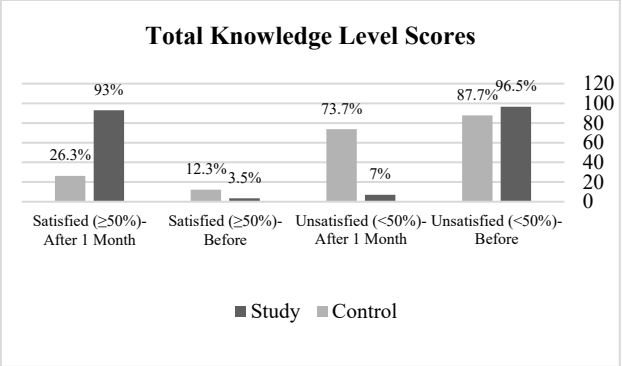

Figure 1. Frequency and distribution of total knowledge level scores before and after one month of telenursing intervention among study and control group (n=114).

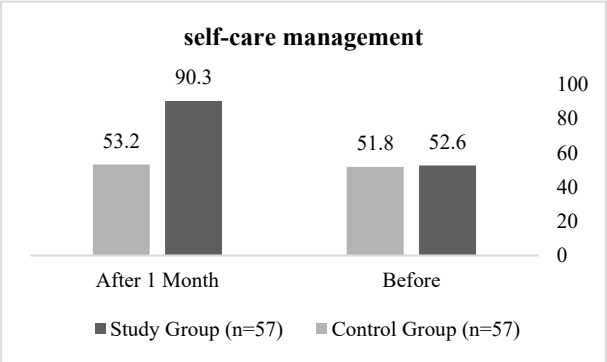

Figure 2. Comparison of Total Self-Care Management Scores Before and One Month After Telenursing Intervention Among Study and Control Groups (n = 114).
Note: Values represent the mean total self-care management scores. Within-group comparisons were analyzed using the paired t-test, and between-group comparisons were analyzed using the independent samples t-test. The statistical significance was set at $p < 0.05$.

would demonstrate a favorable impact on self-care management among participants in the early follow-up period after CABG. The current findings suggest that telenursing interventions were associated with improvements in patients' knowledge and self-care management during the early follow-up period; however, these results should be interpreted cautiously due to methodological limitations.

Patients' personal characteristics

Comparable demographic characteristics between groups strengthened the internal consistency of the findings and reduced the likelihood that outcomes were influenced by background differences. The predominance of middle-aged participants reflects the typical age distribution of patients who undergo CABG. Individuals within this age group may demonstrate greater physical ability and motivation to adopt the recommended self-care management practices.

However, the predominance of male participants limits broader generalization, emphasizing the need for gender-balanced samples in future research. These results align with prior research, Nawaz et al. (2023), which also reported male predominance. Educational

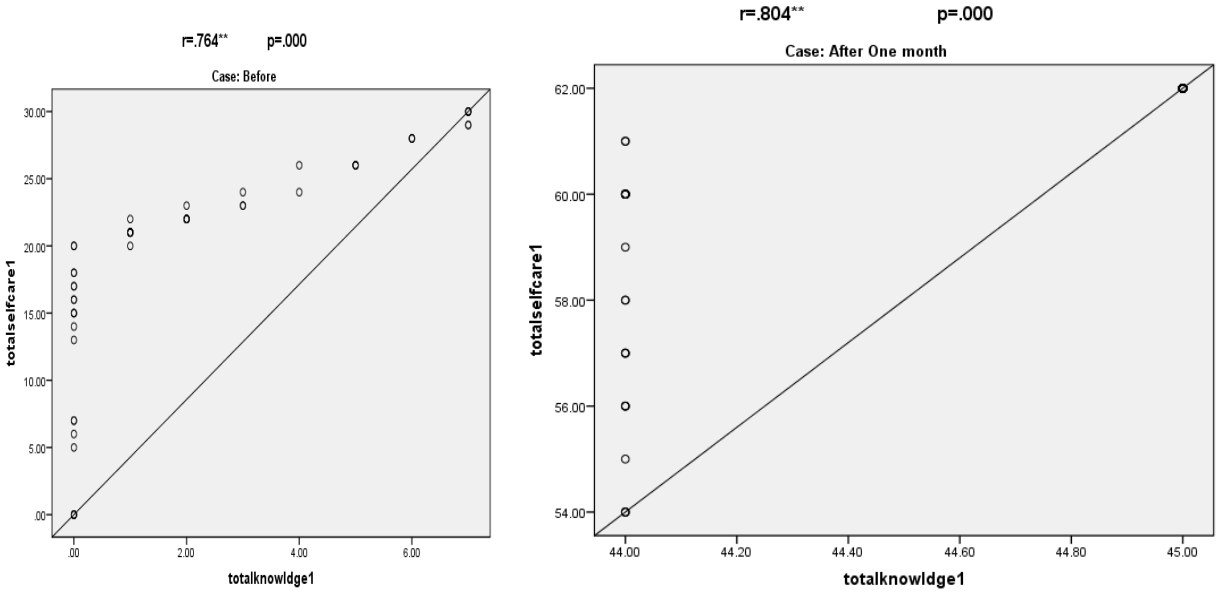

Figure 3. Correlation between knowledge and self-care management for the intervention group before and after one month of telenursing intervention n=57

level appeared to facilitate engagement with telenursing interventions, suggesting that health literacy plays a central role in patients' ability to understand postoperative recommendations and participate in recovery.

A notable finding was the high proportion of rural residents, highlighting the potential accessibility benefits of telenursing and other remote nursing support. Telenursing may help bridge the geographic barriers to follow-up care, particularly in underserved regions. These findings are consistent with Elsayed et al. (2024), those of who revealed that most participants resided in rural locations, which shows the importance of remote instructions and nursing assistance.

Additionally, the absence of prior educational preparation among many participants reinforces the importance of structured post-discharge education delivered through accessible tele-nursing modalities. This finding is in agreement with Elesawy et al. (2019), who demonstrated that a low percentage of the research participants received detailed instructions from healthcare professionals.

Patients' medical history

Baseline differences in comorbidities were an important limitation of this study. Chronic illnesses, such as hypertension and diabetes, may independently affect recovery outcomes and responsiveness to educational interventions. Without statistical adjustment for confounding variables, improvements cannot be solely attributed to the intervention. These findings highlight the need for randomized controlled trials or multivariate analyses to strengthen causal inferences in future research. These findings are in line with Takroni et al. (2023), who stated substantial difference between two study groups in having comorbidities as hypertensive (P= 0.001), diabetic (P= 0.032), myocardial infarction (P= 0.001) that could prolong hospitalization, raise the risk of complications, and have a detrimental effect on postoperative recovery.

Patients' complications

The observed reduction in postoperative complications suggests that continuous nursing communication promotes early symptom recognition, adherence to treatment regimens and timely problem management. Interestingly, while most complications were lower in the intervention group, leg wound infection was significantly higher in the intervention group than in the control group. This unexpected finding suggests that while telenursing may enhance recovery in multiple domains, further investigation is warranted to understand the increased incidence of leg wound infection, which could be related to wound care practices, patient adherence, and other contextual factors. Telenursing appears to function as an extension of hospital care into the home environment, reducing uncertainty after discharge and supporting safe recovery during a vulnerable transition period. These findings are consistent with Gohari et al. (2022), who verified that the implementation of telenursing directives and follow-up might reduce postoperative complications.

Patients' self-care management knowledge

Improvement in patients' knowledge is a key mechanism underlying the effectiveness of the intervention. Telenursing facilitates repeated reinforcement, individualized clarification, and interactive learning that support knowledge retention. However, knowledge acquisition alone is insufficient to ensure sustained behavioral change, indicating the importance of continued follow-up and motivational

reinforcement. These results are consistent with systematic reviews of Soliman (2022) ; Alizadeh & Takasi (2024), who demonstrated that telenursing interventions significantly improve patients' self-care skills, knowledge retention, and willingness to engage in self-care management. These findings contrast with Takahashi et al. (2022), who stated that living in rural areas, being older, and having less education can all limit the effectiveness of telenursing interventions.

Patients' self-care management level

Meaningful enhancement in self-care management across physical, psychological, and social domains indicates that telenursing promotes patient empowerment and autonomy. Continuous professional support may enhance confidence, reduce anxiety, and improve adherence to recommended lifestyle modifications. The present findings are consistent with Javadzade et al. (2024); İlgin et al. (2024), those of who stated a beneficial effect of self-care practices following telenursing and web-based interventions. The findings are contrasted with Abu Shaikha et al. (2025), who reported inconsistent outcomes across studies, suggesting that intervention effectiveness may depend on the intensity, duration, and structure of telenursing programs rather than education alone.

Interrelationship of knowledge and self-care management level

The positive association between knowledge and self-care management suggests that education is a foundational element of recovery. This relationship suggests that higher recognition of warning symptoms, medication regimens, and greater confidence in disease management have beneficial effects on self-care practice levels. However, patient motivation and readiness for behavior change may also influence this relationship, indicating that educational interventions should be combined with behavioral support strategies. This was consistent with Keshavaraz et al. (2021) ; Alizadeh & Takasi (2024), who showed that telenursing interventions enhance self-care management.

Correlations of self-care management

Educational level and occupational status are associated with better self-care management; however, causality cannot be inferred, indicating that health literacy and socioeconomic factors may affect responsiveness to tele-nursing interventions. Conversely, individuals with limited technological skills or reduced access to digital resources may experience barriers to fully benefiting from telenursing services. Therefore, tailored educational strategies and simplified technological platforms are recommended to ensure equitable implementation. The findings are consistent with Bagheri et al. (2025), those of who reported that actively employed patients or those with higher educational attainment had better self-care management outcomes after a month. However, previous studies have reported inconsistent findings, as Piotrowicz et al. (2024), who found that telenursing intervention did not significantly enhance self-care management practices. This suggests that measuring the true impact of an intervention may be challenging.

The lack of randomization limits causal inference and may increase susceptibility to confounding factors. Natural postoperative recovery or external influences may have contributed to these changes. The relatively small sample size may have reduced the statistical power and limited generalizability. Conducting the study in one healthcare facility restricted external validity and may have reflected local practice patterns. Self-care management was assessed using self-reported instruments, which may have introduced reporting or social desirability bias. Participants may have modified their behavior simply due to awareness of being observed, which could have inflated the measured improvements. The one-month follow-up period did not allow for the assessment of the long-term sustainability of knowledge and behavioral changes.

Despite these limitations, the findings provide practical insights. Telenursing may serve as a viable alternative to conventional discharge instructions. Clinical practice implementation may encompass a structured post-discharge telephone follow-up schedule, standardized educational scripts and checklists, integration with WhatsApp or secure messaging platforms, training programs for nursing staff on remote communication competencies, monitoring systems for early complication recognition, and the incorporation of telenursing into transitional care programs to improve continuity of care, especially for rural populations. Nevertheless, additional randomized controlled trials with larger and more heterogeneous samples are essential before the broad application of policies.

Conclusion

This quasi-experimental study highlights the potential of telenursing as a supportive educational strategy for patients recovering from CABG. Patients who received structured telenursing interventions demonstrated meaningful improvements in both knowledge and self-care management during the early follow-up period, suggesting that remote nursing support can enhance preparedness for recovery and empower patients to engage more effectively in their care. Importantly, the findings also indicated a positive relationship between knowledge acquisition and self-care practices, reinforcing the value of targeted education in improving postoperative outcomes.

At the same time, the study's design and relatively short follow-up period limit the ability to draw definitive causal conclusions, and the results should be generalized

with caution to other populations. These outcomes point toward the promise of telenursing interventions, but they also underscore the need for future research employing randomized controlled designs, larger sample sizes, and extended follow-up durations to build a stronger evidence base. Integrating telenursing into nursing education and clinical practice, alongside training staff in its application, could further support its implementation and maximize its impact on patient recovery.

Acknowledgments

The authors would like to express their sincere thanks to the institutions that provided organizational and scientific support for this academic project. The authors express sincere appreciation to all individuals who contributed to this work, particularly the caregivers and patients in the Cardio-Thoracic Surgery Department at Assiut University Heart Hospital for their cooperation and positive responses.

Declaration Of Generative Artificial Intelligence (AI) Use

The authors carefully utilized QuillBot to check grammar, spelling, and fundamental language refinement in English. No AI tool was used for content generation, scientific writing, data analysis, interpretation, or any other substantive aspect of the research. All authors reviewed the work and accepted full responsibility for its final content.

Funding source

This research is independently funded.

Availability of data and materials

The data that support the results of the current research are not accessible to everyone due to ethical constraints but can be obtained from the corresponding author after acceptable demand and including permission from the ethical committee.

Authors' contributions

The first author contributed to the data collection, literature review, analysis, and manuscript preparation. The second, third, and fourth authors helped develop the design and idea, as well as their supervision and critical revision of the research.

Declaration of Interest

The authors declare no conflicts of interest.

References

Abdelatief, D.A. et al. (2019) 'Effect of Nursing Guidelines Using Mobile what's App Application on Self-management of Patients Undergoing Diagnostic Cardiac Catheterization'. Egyptian Journal of Health Care, 10(3), pp. 517–534. Available at: https://www.researchgate.net/publication/377845499.

Abu Shaikha, H. S. *et al.* (2025) 'Impact of a Modified Discharge Program on Health-related Quality of Life Following Coronary Artery Bypass Grafting: A Randomized Controlled Trial', *The Open Nursing Journal*, 19(1). doi: 10.2174/0118744346368558250320043722.

Alizadeh, T. and Takasi, P. (2024) 'Effect of telenursing on self-efficacy of patients undergoing coronary artery bypass grafting surgery: A systematic review', *Journal of Nursing Reports in Clinical Practice*, 0(0), pp. 0–0. doi: 10.32598/JNRCP.2401.1011.

Ariyanti, D. *et al.* (2025) 'The Role of CHA_2DS_2-VASc Score in Predicting Clinical Complications Following Primary Percutaneous Coronary Intervention: A Systematic Review and Meta-Analysis', *Catheterization and Cardiovascular Interventions*, 106(7), pp. 3553–3563.

Bagheri, S. *et al.* (2025) 'Impact of psycho-educational interventions on patients undergoing Coronary Artery Bypass Grafting Surgery', *Journal of Cardiothoracic Surgery*, 20(1), p. 223. doi: 10.1186/s13019-025-03461-3.

Bikmoradi, A. et al. (2023) 'The impact of telenursing on level of depression, stress and anxiety in discharged patients after coronary artery bypass graft surgery: A randomized clinical trial', Journal of Vascular Nursing, 41(3), pp. 89–94. doi: 10.1016/j.jvn.2023.05.003.

Center, P. H. *et al.* (2025) 'The effect of TeleCARE nursing on cardiac patients' adherence to discharge instructions and clinical outcomes: A randomized controlled trial Estioko, Edreck The effect of TeleCARE nursing on cardiac patients' adherence to discharge instructions and clinical outcomes: A randomized controlled trial', *International Journal of Research Studies in Management*, 13, pp. 77–88. doi: 10.5861/ijrsm.2025.25103.

Elsayed, E., Gaballah, S. and Taha, nadia (2024) 'Knowledge and Self – efficacy for Post CABG Surgery patients', *Trends in Nursing and Health Care Journal*, 8(1), pp. 145–172. doi: 10.21608/tnhcj.2024.238025.1030.

Ghandakly, E. C., Iacona, G. M. and Bakaeen, F. G. (2024) 'Coronary Artery Surgery: Past, Present, and Future', *Rambam Maimonides Medical Journal*, 15(1), p. e0001. doi: 10.5041/RMMJ.10515.

Gohari, F. *et al.* (2022) 'Comparison of the effectiveness of home visits and telephone follow-up on the self-efficacy of patients having undergone coronary artery bypass graft surgery (CABG) and the burden of their family caregivers: A randomized con-trolled trial', *Investigacion y educacion en enfermeria*, 40(1). doi: 10.17533/UDEA.IEE.V40N1E14.

Hariyono, H. *et al.* (2025) 'Telemonitoring-Based Cardiac Care to Reduce Readmissions in Coronary Heart Disease Patients', *Jurnal Kesehatan Masyarakat*, 21(2), pp. 341–347.

Hojjati, H., & Pour, N.H. (2025) 'The Importance of Telenursing in Nursing: A Paradigm Shift in Chronic Patient Care', The Journal of Telemedicine, 2(2), pp. 33–35. doi: 10.32592/TJT.2025.2.2.33.

Ignatavicius, D. D. *et al.* (2025) 'Critical care of patients with acute coronary syndromes', in *Medical-Surgical Nursing: Concepts for Interprofessional Collaborative Care*. 11th edn. Elsevier.

İlgin, V.E. et al. (2024) 'Effects of telephone nursing education and counselling on discharge satisfaction level and self-care strength of patients after coronary artery bypass grafting', ANZ Journal of Surgery, 94(10), pp. 1768–1775. doi: 10.1111/ans.19175.

Javadzade, H. *et al.* (2024) 'The effect of web-based education on self-care behaviors in cardiovascular patients: application of the pender's health promotion model', *Archives of Public Health*, 82(1), p. 64. doi: 10.1186/s13690-024-01299-0.

Keshavaraz, N. *et al.* (2021) 'Effect of telenursing on stress, anxiety and depression in patients with myocardial infarction', *Neuropsychiatria i Neuropsychologia*, 16(1–2), pp. 76–81. doi: 10.5114/nan.2021.108036.

Maleki, M. *et al.* (2023) 'The effect of hospital-to-home transitional care using a digital messaging application on the health outcomes of patients undergoing CABG and their family caregivers: a randomized controlled trial study protocol', *Frontiers in Cardiovascular Medicine*, 10, p. 1224302. doi: 10.3389/FCVM.2023.1224302.

Marti, E. *et al.* (2025) 'Improving outcomes in acute coronary syndrome: A meta-analysis of home-based compared to hospital-based cardiac rehabilitation and usual care: 3–4 months (end of the program) and 9–10 months (6 months after the end of the program)', *American Journal of Preventive Cardiology*, 22, p. 100982.

Mohamed Elesawy, F. *et al.* (2019) 'Effect of Implementing Discharge Plan on Patient's Outcomes Post Coronary Artery Bypass Graft Surgery', *Egyptian Journal of Health Care*, 10(3), pp. 517–534. doi: 10.21608/ejhc.2019.252377.

Mohamed Mohamed Soliman, H. (2022) 'Effect of Tele-nursing -Based Self-management Program on Cardiac Self-efficacy and Heart

Health Indexes among Myocardial Infarction Patients', *Egyptian Journal of Health Care*, 13(1), pp. 453–470. doi: 10.21608/ejhc.2022.218563.

Mohebi, Z. et al. (2025) 'The impact of an educational discharge program based on Orem's self-care model on lifestyle, hope, and treatment adherence in coronary angioplasty patients: a randomized controlled clinical trial', BMC Research Notes, 18(1), p. 105. doi: 10.1186/s13104-025-07164-9.

Muliantino, M. R. *et al.* (2024) 'Self-efficacy in increasing physical activity of coronary heart disease patients: a cross-sectional study', *J Ners*, 19(3), pp. 371–377.

NAWAZ, R., SARWAR, H. and MASIH, S. (2023) 'EFFECTS OF NURSING INTERVENTIONS ON SELF CARE AND WOUND MANAGEMENT AMONG POST- CORONARY ARTERY BYPASS GRAFTING PATIENTS', *Biological and Clinical Sciences Research Journal*, 2023(1), p. 515. doi: 10.54112/bcsrj.v2023i1.515.

Panzeri, A. *et al.* (2025) 'Psychological and Physical Health Improvements After Coronary Bypass: A Longitudinal Study in Cardiovascular Rehabilitation', *European Journal of Investigation in Health, Psychology and Education*, 15(10), p. 203. doi: 10.3390/ejihpe15100203.

Phukan, P. and Phukan, P. (2023) 'Spoken knowledge in low literacy diabetes scale: Reliability and validity assessment on Indian Type 2 diabetes patients', *Indian Journal of Medical Sciences*, 74(3), pp. 152–154. doi: 10.25259/IJMS_436_2020.

Piotrowicz, K. *et al.* (2024) 'Health-related quality of life and self-care in heart failure patients under telecare—insights from the randomized, prospective, controlled AMULET trial', *Frontiers in Public Health*, 12. doi: 10.3389/fpubh.2024.1431778.

Said, N.Y., Nasr, M.H. & Ebraheim, M.N. (2022) 'Assessment of Patients' Knowledge and Lifestyle Before Coronary Artery Bypass Grafting Surgery', Egyptian Journal of Health Care, 13(1), pp. 1065–1071. doi: 10.21608/EJHC.2022.223308.

Setyowati, S. *et al.* (2024) 'Self-Care Practices and Perspectives in Managing Coronary Heart Disease Patients: A Qualitative Study', *Nursing Reports 2024, Vol. 14, Pages 3264-3279*, 14(4), pp. 3264–3279. doi: 10.3390/NURSREP14040237.

Siahaan, H. *et al.* (2025) 'Risk Factor for In-Stent Restenosis in Premature Coronary Heart Disease: Systematic Review and Meta-analysis.', *Malaysian Journal of Medicine & Health Sciences*, 21.

Soliman, H.M. (2022) 'Effect of Tele-nursing -Based Self-management Program on Cardiac Self-efficacy and Heart Health Indexes among Myocardial Infarction Patients', Egyptian Journal of Health Care, 13(1), pp. 453–470. doi: 10.21608/ejhc.2022.218563.

Supriyanto, Supriyanto, Nasronudin, N. and Supriyanto, Stefanus (2026) 'Integrating acute coronary syndrome services through the PSC 119 platform: The LASKAR model for emergency cardiac care in Indonesia', *Heart Science Journal*, 7(1), pp. 105–108.

Takahashi, E. A. *et al.* (2022) 'An Overview of Telehealth in the Management of Cardiovascular Disease: A Scientific Statement From the American Heart Association', *Circulation*, 146(25). doi: 10.1161/CIR.0000000000001107.

Takroni, M. *et al.* (2023) 'The Impact of Common Comorbidities on the Cardiopulmonary Rehabilitation Outcomes and Cost of Care for Post-CABG Surgery Patients

 ', *Cardiology and Cardiovascular Research 2023, Volume 7, Page 75*, 7(4), pp. 75–81. doi: 10.11648/J.CCR.20230704.12.

Thompson, S. K. (2012) 'Sample size', in Sampling. 3rd ed, pp. 59–60.

Urden, L. D. , *et al.* (2024) 'Cardiovascular therapeutic management', in *Priorities in Critical Care Nursing* . 9th edn. Elsevier, pp. 227–234.

Wahyuningsih, I. S. *et al.* (2025) 'The effect of spiritual care based self-regulation on physical and environmental comforts in coronary heart disease patients in ICUs', *J Med Pharm Chem*, pp. 1349–1360.

WHO (2025) *Cardiovascular diseases (CVDs)*. Available at: https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds) (Accessed: 23 February 2026).

Wu, K. A. *et al.* (2023) 'Digital Health for Patients Undergoing Cardiac Surgery: A Systematic Review', *Healthcare (Switzerland)*, 11(17). doi: 10.3390/HEALTHCARE11172411/S1.

Yousef Said, N., Houssien Nasr, M. and Nadr Ebraheim, M. (2022) 'Assessment of Patients' Knowledge and Lifestyle Before Coronary Artery Bypass Grafting Surgery', *Egyptian Journal of Health Care*, 13(1), pp. 1065–1071. doi: 10.21608/EJHC.2022.223308.

How to cite this article: Farag, S. I. A., Abozead, S. E., Ghanem, H. M, and Elkhayat, H. (2026) 'Effect of A Telenursing Educational Intervention on Knowledge and Self-Care Management among Patients after CABG: A Quasi-Experimental Study', *Jurnal Ners*, 21(2), pp. 235-244. doi: http://dx.doi.org/10.20473/jn.v21i2.83316