The impact of a self-management program on exercise adherence among patients discharged after coronary artery bypass grafts: A quasi-experimental study in Thailand

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Abstract

Background: Exercise adherence is essential for maintaining the physical and mental health of patients after coronary artery bypass grafts (CABG). However, adherence is often poor, particularly in the early weeks after hospital discharge, leading to adverse health outcomes. Therefore, implementing self-management programs is crucial to promote and sustain long-term exercise adherence among these patients.

Objective: This study aimed to examine the impact of self-management programs on exercise adherence in post-CABG patients.

Methods: A quasi-experimental posttest-only control group study was conducted from April to November 2022 at Surat Thani Hospital in Thailand. Forty post-CABG patients were gender and age-matched and randomly assigned to either the control group (n = 20) or the experimental group (n = 20). The experimental group participated in a six-week self-management program for exercise adherence, utilizing telephone and LINE applications, while the control group received standard care. Data were collected using validated exercise adherence rating scales and a self-management questionnaire. Descriptive statistics and independent t-tests were employed for data analysis.

Results: The mean exercise adherence score in the control group was 9.30 (SD = 4.91), whereas it was 21.30 (SD = 3.20) in the experimental group. The experimental group, which received the self-management program, exhibited significantly higher exercise adherence scores compared to the control group (t = 9.16, df = 32.65, p <0.001).

Conclusions: This study demonstrates the effectiveness of a post-CABG self-management program in improving exercise adherence. Nurses play a crucial role in promoting and enhancing self-management during the pre-and post-discharge phases, and regular phone or LINE application contacts can have a positive impact on post-CABG patients. Policymakers should consider implementing self-management programs to encourage patients to maintain their exercise routines, leading to improved physical and mental well-being.

Keywords

Background

Coronary artery disease (CAD) is a leading cause of death worldwide, with a significant impact on global mortality. According to a study by Tsao et al. (2022), approximately 244.1 million people worldwide received a CAD diagnosis last year, resulting in a mortality rate of 112.37 per 100,000 people. In Thailand, the mortality rate due to CAD between 2017 and 2021 was recorded as 31.8, 31.8, 31.4, 32.6, and 33.5 per 100,000 people, respectively, indicating that the national mortality rate for CAD has remained relatively stable (Strategy and Planning Division Ministry of Public Health Thailand, 2022).

Currently, there are various treatment options available for CAD. One of the most crucial therapies for patients with CAD

is coronary artery bypass graft (CABG). This procedure is utilized when a patient's condition worsens or fails to respond to oral medication or when coronary artery balloon dilation is not feasible due to improper positioning or multiple stenosis of the arteries used (Hillis et al., 2012). CABG has proven to be a valuable treatment method in improving survival rates and reducing mortality among patients with CAD (Head et al., 2014; Neumann et al., 2019).

Statistically, the number of patients undergoing coronary artery bypass graft (CABG) in Thailand has shown an increasing trend. According to The Society of Thoracic Surgeons of Thailand (2022), the statistics indicate that in 2017, 5,171 patients underwent CABG, while in 2018 and 2019, the numbers rose to 5,970 and 6,646, respectively. This upward trend in post-CABG patients highlights this issue's

significance in public health (The Society of Thoracic Surgeons of Thailand, 2022; Yanagawa et al., 2017). Considering the increasing number of patients post-CABG, it is crucial for them to be prepared for potential lifestyle modifications (Knuuti et al., 2020; Vachenauer et al., 2008), emphasizing the importance of lifestyle changes such as adopting healthier eating habits, quitting smoking, adhering to medication regimens, and participating in exercise programs. These modifications are essential in reducing the risk of recurrence and mortality (Kulik et al., 2015; Nahapetyan, 2007; Task Force Members et al., 2013) and improving patients' overall quality of life (Anderson et al., 2016; Kulik et al., 2015; Prabhu et al., 2020).

Several studies have investigated the lifestyle factors of patients who have undergone CABG and their adherence to these factors one year after hospital discharge. The literature review identified relevant studies by Griffo et al. (2013), Højskov et al. (2020), Balasi et al. (2015), and Wattanasin and Chupan (2017). The findings of these studies indicate varying levels of adherence to different lifestyle modifications among post-CABG patients. Griffo et al. (2013) reported that 72.0% of patients adhered to recommended eating habits, while 74.0% successfully quit smoking. Regarding medication adherence, Balasi et al. (2015) found that 81.1% of patients followed their prescribed medication regimen. However, regarding exercise adherence, particularly in the initial four weeks after CABG, Højskov et al. (2020) revealed a lower adherence rate of only 30.0%. The recommended forms of exercise during this period include treadmill walking, stationary bike riding, and stationary hand spinner exercises, with a frequency of three times a week for 12 weeks (The Heart Association of Thailand under the Royal Patronage, 2020). The lower adherence to exercise among this group of patients may be attributed to various factors. Ali et al. (2017) pointed out that the methods and forms of exercise may not have been suitable for these patients. Additionally, the requirement for patients to visit the hospital where the exercise program was conducted often posed challenges and inconveniences, resulting in difficulty adhering to the scheduled exercise program (American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR), 2020).

Nurses play a crucial role in providing continuous monitoring, offering advice, and addressing patient concerns (Supervia et al., 2019). They have an independent role in patient care, adhering to professional principles, managing appropriate programs, and collaborating with multidisciplinary teams. Nurses can develop a patient care model that ensures good health, sustainability, and success (Yuroong et al., 2021). Therefore, focusing on a self-management program during the initial phase of postoperative care is essential for promoting exercise adherence among post-CABG patients. Encouraging long-term exercise adherence is crucial in delaying disease progression, reducing recurrence, and improving quality of life. With this rationale, our study aimed to examine how self-management programs affect post-CABG exercise adherence in Thailand.

The four weeks after hospital discharge is a critical early stage for exercise adherence among post-CABG patients. Exercise plays a vital role in cardiovascular health and overall well-being. Motivating patients to adhere to a self-managed exercise regimen is crucial for their overall health. Patient self-

management involves medical management, role management, and emotional management. Developing essential self-management skills such as problem-solving, decision-making, resource utilization, forming a partnership with healthcare providers, taking action, and self-tailoring is crucial to effective self-management. Incorporating these concepts within a self-management program can contribute to improved exercise adherence among patients post-CABG (American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR), 2020; Lorig & Holman, 2003).

Methods

Study Design
The design of this study was quasi-experimental, with a posttest-only control group. The study was conducted at Surat Thani Hospital in Thailand from April 2022 to November 2022.

Samples/Participants
The participants included patients admitted to the in-patient surgery department who met specific inclusion criteria. These criteria consisted of 1) being Thai, 2) undergoing their first post-CABG procedure two days prior to discharge, not having any other surgeries involved, c) being 20 years of age or older, d) having no cognitive impairment or disabilities, e) having stable vital signs with a monitored EKG showing normal sinus rhythm, and f) the patients were required to have access to the LINE application for the purpose of the study. The only exclusion criterion was if the patient required crisis or urgent treatment, such as experiencing chest pain, dysrhythmia, or dyspnea, either before or after discharge.

To ensure statistical power in line with the quasi-experimental design rule of thumb, a minimum sample size of 20 participants is required (Hair, 2010; Schumacker & Lomax, 2010). In this study, the participants were matched based on gender and age, as suggested by Blanchard et al. (2002) and Stepanczuk and Charvat (2010).

Following the matching process, the participants were randomly divided into two groups: a control group consisting of 20 participants and an experimental group consisting of another 20 participants. The experimental group attended six-week exercise adherence self-management sessions, while the control group received conventional care, as depicted in **Figure 1**.

Instruments
In this study, three instruments were utilized, with permission from the original authors for all instruments except the socio-demographic assessment.

The socio-demographic profile questionnaire comprised gender, age, marital status, education, occupation, income, and co-morbidity. Clinical data collected included vital signs and a normal electrocardiogram, providing essential information about the participants' health status.

Exercise adherence was measured using the 6-item Adherence Use Exercise Adherence Rating Scale (EARS) developed by Newman-Beinart et al. (2017). This scale assessed the extent to which post-CABG patients adhered to exercise practices or activities as agreed upon with the researchers. It considered factors such as moderate exercise intensity, frequent exercise for at least 150 minutes per week,

and incorporating exercise into daily routines. Patients were asked to rate their adherence to exercise on a 5-point Likert scale: 0 = strongly disagree, 1 = disagree, 2 = uncertain, 3 = agree, and 4 = strongly agree. The overall score on the EARS could range from 0 to 24, with higher scores indicating greater exercise adherence. The internal consistency of the scale, measured using Cronbach's alpha coefficient, was 0.81 in a previous study and 0.73 in this study.

Self-management was assessed using a 10-item questionnaire based on the concept developed by Lorig and Holman (2003). This questionnaire measured the patient's ability to self-manage their exercise routines and manage their chronic disease effectively. The questionnaire encompassed three components: 1) medical management (four items), 2) role management (three items), and 3) emotional management (three items). Participants rated their self-management on a 5-point scale: 1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always. The overall score on the self-management questionnaire could range from 10 to 50, with higher scores indicating higher levels of self-management. Content validity, assessed by five experts, yielded a value of 0.94. The internal consistency of the questionnaire, measured by Cronbach's alpha coefficient, was 0.79.
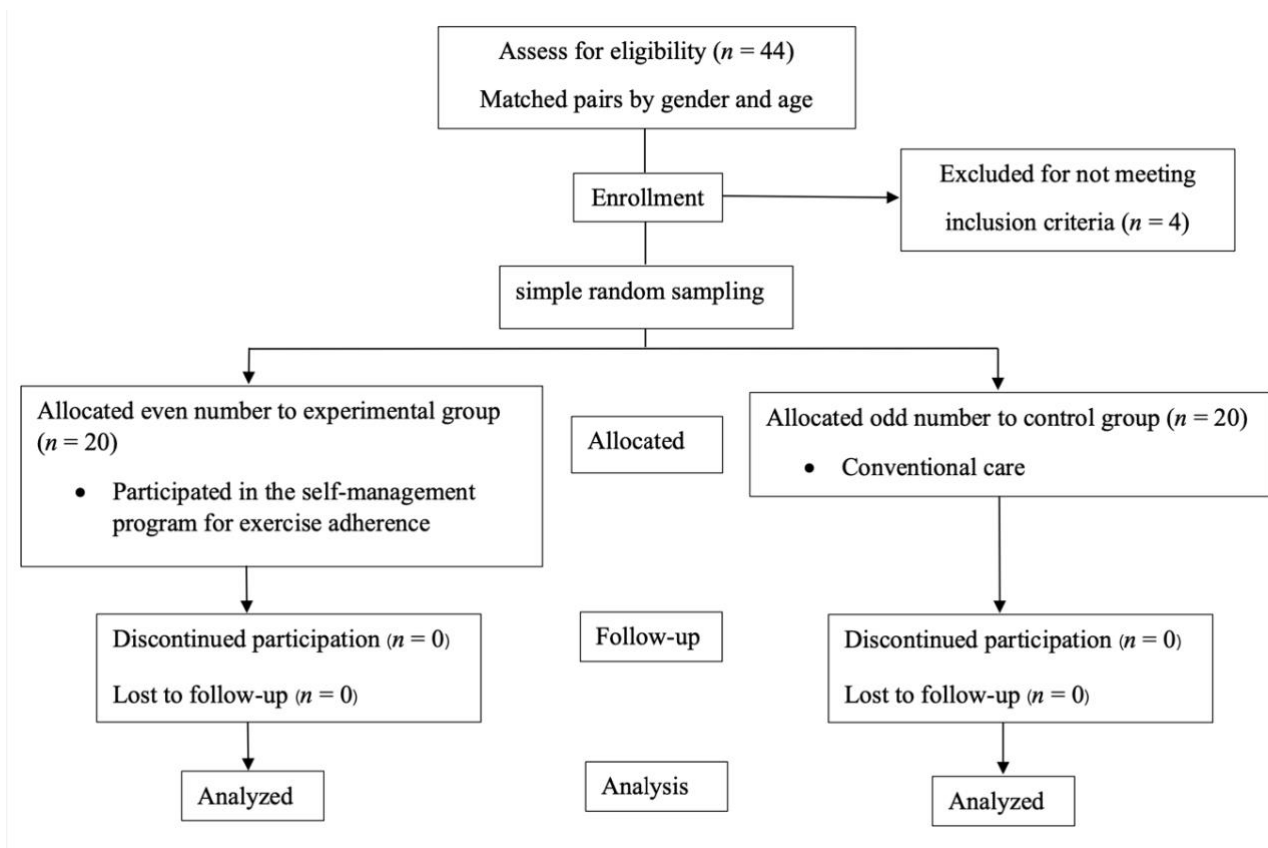

Figure 1 Flow of participants' selection

Interventions
For experimental group
The development of a self-management program utilizing the LINE application aims to promote active and effective regulation of behaviors, thoughts, and emotions among patients. Self-management involves understanding one's responsibilities across various aspects of life and taking necessary actions to fulfill those responsibilities. Patients with strong self-management skills are equipped with the knowledge and strategies to navigate different situations. Therefore, this program focuses on three key self-management tasks: 1) medical management, 2) role management, and 3) emotional management. To achieve exercise adherence, participants are required to acquire and apply six essential self-management skills, as outlined in **Table 1**.

The researchers created the self-management program by integrating the concepts proposed by Lorig and Holman (2003) and the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) (2020). To ensure the program's validity, a content validity assessment was conducted by five experts, resulting in a high validity score of 0.94. Additionally, the experimental group exhibited a high congruence rate of 100% after completing the six-week program, indicating that all participants demonstrated high adherence to the program's principles and successfully applied the acquired self-management skills in their daily lives.

The activities and components of the self-management program are outlined in detail in **Table 2**, providing a comprehensive overview of the program's structure and content. Furthermore, **Figure 2** provides a visual representation of the program's flow and the sequential progression of activities for the participants.

Table 1 Components of the self-management program

Components of the Self-Management	Strategies and Application	Methods to Communication	Six Skills of Self-Management
Medical Management (Taking medication regularly, eating a specific diet, engaging in regular exercise appropriate to the symptoms, regular follow-up, etc.)	(1) Patients talked about experiences or obstacles related to exercise adherence (2) Researchers created a simulation to make available to practice system decision-making skills (3) Researchers explained guidelines for gaining access to resources about exercise through a booklet and software LINE applications	• Face-to-face • PowerPoint and Booklet • LINE application • Telephone call	• Problem-solving (1) • Decision-making (2) • Resource utilization (3)
Role Management (Behavior modification after surgery to suit the illness, symptoms management, collaboration between patients and researchers)	(5) Participants assessed themselves before exercise (6) Evaluation in the six weeks after the practice. Adjusting the activities to suit themselves and allowing patients to ask questions and give encouragement	• Face-to-face • PowerPoint and Booklet • LINE application • Telephone call • Train patients to practice skills: walking, exercising muscles, pulse measurement, warm up, stretching, cool down, and abnormal symptoms while or after exercise. • Q & A	• Taking action (5) • Self-tailoring (6)
Emotional Management (Managing emotional effects such as stress, anxiety, fear, etc.)	(2) Increase confidence in exercise adherence (3) Participants were able to consult researchers when abnormal symptoms occurred during or after exercise (4) Researchers concentrated on the participants' awareness of the importance of decision-making about exercise adherence. They were trained to assess themselves before exercising every time. (6) Participants adjusted activities to suit the patients themselves until successful	• Face-to-face • PowerPoint and Booklet • LINE application • Telephone call • Q & A	• Decision-making (2) • Utilize resources (3) • Forming a patient/ health care provider partnership (4) • Self-tailoring (6)

Note: (1) problem-solving; (2) Decision making; (3) Resource utilization; (4) Forming a patient/health care provider partnership; (5) Taking action; (6) Self-tailoring

Table 2 The six-week self–management program for the experimental group

Weeks	Self-Management Program	Methods	Time
1	**Two days before discharge**: (a) Teaching about coronary artery disease factors (b) Explaining what a coronary artery bypass graft is (c) Conduit and wound. Advantages of self-management and exercise adherence	• Face-to-face • PowerPoint	30 min
	One day before discharge, Teach the self–management program: (a) Problem-solving - patients who have post-CABG concerns about barriers to exercise adherence after discharge share experiences via video media (b) Decision-making- the researcher will create and make available a simulation for practicing decision-making skills and increasing confidence in exercise adherence, discussing issues such as chest pain symptoms during exercise, pain in the surgical wound at the sternum during exercise, etc. (c) Resource utilization- researcher explains guidelines for gaining access to resources about exercise through a booklet and LINE applications (d) Forming a patient/health care provider partnership – the researcher will concentrate on the participants' s awareness of the importance of decision-making about exercise adherence (e) Taking action - researchers train patients vis the LINE application and booklet to practice skills: walking, exercising muscles, pulse measurement, warm up, stretching, cooling down, and being aware of abnormal symptoms during or after exercise	• Face-to-face • PowerPoint • Video • Booklet • Train patients to practice skills	30 min
2 -5	**Telephone follow-up and coaching participants**: Every week, researchers used the LINE application to send exercise videos to the participants, who in turn shared their own exercise videos with the researchers through the same application	• Telephone • Videos • Line application	10-15 min/week
6	**Self-tailoring was evaluated six weeks after the practice**: Patients were encouraged to adjust the activities to suit themselves, and patients were allowed to ask questions and will be given encouragement	• Telephone or face-to-face • Self-management questionnaire	10-15 min

Figure 2 Self-management program

For control group

The control group in this study received standard care within the cardiac in-patient unit of the department. This care involved close observation and monitoring of patients after their discharge from the hospital. The control group also received guidance and advice regarding essential self-care practices, including wound care, managing pain at the surgical wound site in the sternum, stress management, considerations for sexual intercourse, medication adherence, exercise recommendations, and potential complications. The exercise adherence rating scale was utilized seven weeks after discharge to evaluate the control group's exercise adherence. This rating scale served as a tool to assess the level of adherence to exercise among the control group members, providing valuable insights into their post-discharge exercise routines and behaviors.

Data Collection

The data collection was conducted by the researchers themselves. Participants who agreed to participate in the study were required to provide informed consent before undergoing randomization into either the control or experimental groups. The randomization process was done using simple random sampling to ensure equal representation across both groups.

The experimental group participated in a six-week self-management program encompassing three tasks: medical, role, and emotional management. Within these tasks, participants were guided to develop and apply six essential self-management skills: problem-solving, decision-making,

resource utilization, forming a patient-provider partnership, action planning, and self-tailoring. On the other hand, the control group received standard care per the usual protocols. Socio-demographic and clinical data were collected from all participants at the beginning of the study. Over the course of six weeks, the experimental group underwent direct assessments of their self-management progress.

Following the completion of the six-week intervention, exercise adherence was evaluated in both the control and experimental groups using the Exercise Adherence Rating Scale (EARS) eight weeks after the intervention. This assessment aimed to measure the level of exercise adherence achieved by participants in each group.

Data Analysis

Statistical analysis in this study was conducted using IBM SPSS version 21. The demographic and clinical data collected from the participants were analyzed using descriptive statistics, including frequency, percentage, means, and standard deviation. To compare the exercise adherence between the experimental and control groups, an independent *t*-test was employed.

Ethical Considerations

The study was approved by the Institutional Review Board of Chulalongkorn University, Thailand (COA. No 046/65), and the Ethics Committee of Surat Thani Hospital, Thailand (COA. No 006/2565). Participants were provided with detailed information about the study purpose, procedures, and their

rights as participants. They were assured of their anonymity and the confidentiality of their personal information. Prior to their involvement, all participants provided informed consent, indicating their voluntary decision to participate after understanding the study's objectives and requirements.

Results

Characteristics of the Participants

In the control group, the participants had an average age of 65.15 years (SD = 7.82). The majority of the participants were male, accounting for 75% of the group, and 90% were married. Regarding education, over 55% of the participants had completed primary school. In terms of occupation, 55% of the participants were engaged in agricultural work. Approximately half of the participants reported a monthly income ranging from 15,000 to 30,000 baht (396.41 - 792.81 USD). Additionally, a significant proportion of the participants (90%) had co-morbid conditions. On the other hand, the experimental group had an average age of 61.75 years (SD = 7.18). Similarly, 75% of the participants were male, and 80% were married. Regarding education, around 65% of the participants had completed primary school. Regarding occupation, approximately 45% of the participants were involved in agricultural work. Like the control group, half of the participants reported a monthly income ranging from 15,000 to 30,000 baht (396.41 - 792.81 USD). The majority of the participants in the experimental group (85%) also had co-morbid conditions (**Table 3**).

Table 3 Demographic and clinical characteristics of the participants ($N = 40$)

Characteristics	Control n (%)	Experiment n (%)
Gender		
Male	15 (75.0%)	15 (75.0%)
Female	5 (25.0%)	5 (25.0%)
Age (years)		
50 – 59	7 (35.0%)	8 (40.0%)
60 – 69	6 (30.0%)	9 (45.0%)
70 – 79	7 (35.0%)	3 (15.0%)
Average age	M = 65.2, SD = 7.8	M = 61.8, SD = 7.2
Marital Status		
Single	1 (5.0%)	3 (15.0%)
Married	18 (90.0%)	16 (80.0%)
Divorce	1 (5.0%)	-
Widow	-	1 (5.0%)
Education		
Primary school	11 (55.0%)	13 (65.0%)
Secondary school	4 (20.0%)	5 (25.0%)
Diploma	1 (5.0%)	-
Bachelor's degree	4 (20.0%)	2 (10.0%)
Work		
Employee	-	2 (10.0%)
Agriculturist	11 (55.0%)	9 (45.0%)
Butler/Housewife	2 (10.0%)	3 (15.0%)
Government officer	2 (10.0%)	-
Other	5 (25.0%)	6 (30.0%)
Income (Baht)		
0 – 15,000 Bath	7 (35.0%)	8 (40.0%)
15,000 – 30,000	10 (50.0%)	10 (50.0%)
More than 30,001	3 (15.0%)	2 (10.0%)
Underlying disease		
Yes	18 (90.0%)	17 (85.0%)
None	2 (10.0%)	3 (15.0%)

Self-Management Program on Exercise Adherence

Exercise adherence scores were 9.30 (SD = 4.91) for the control group and 21.30 (SD = 3.20) for the experimental group. The positive skewness value (1.03) indicates that the majority of individuals in both groups had exercise adherence scores skewed towards higher values. Additionally, the positive kurtosis value (1.50) suggests a normal distribution and curve for exercise adherence.

Regarding self-management, the control group had a mean score of 39.95 (SD = 7.99). In contrast, the experimental group had a higher mean score of 47.00 (SD = 4.78), indicating higher self-management in the experimental group.

To assess exercise adherence, the EARS questionnaire data were used. The control group had a mean score of 9.30 (SD = 4.91), while the experimental group had a mean score of 21.30 (SD = 3.20), reflecting a significant difference between the two groups. Levene's test confirmed unequal variances (F = 11.08, $t = 9.16$), necessitating the use of non-equal variances when comparing exercise adherence between the control and experimental groups.

The independent t-test revealed a significant difference in the post-test exercise adherence score between the experimental and control groups ($t = 9.16$, df = 32.65, $p < 0.001$) (**Table 4**). The mean score difference between the two groups at a 95% confidence interval was 9.333 (lower bound) to 14.667 (upper bound).

Table 4 Difference in exercise adherence between groups

Groups	Mean	SD	*t*	df	*p*
Control	9.30	4.91	9.16	32.65	<0.001
Experiment	21.30	3.20			

p <0.05.

Discussion

The findings of this study revealed that the majority of participants in both the experimental and control groups were male and married, with mean ages of 61.8 and 65.2, respectively. Around 65.0% of the participants in the experimental group had completed elementary school education, while only 55.0% of the control group had the same level of education. These socio-demographic characteristics reflect the composition of the sample and provide insights into the population under study.

The results indicated that post-CABG participants in the experimental group exhibited higher exercise adherence than the control group. This can be attributed to the program's effectiveness in enhancing participants' exercise knowledge and skills, delivered by the researchers via telephone and the LINE application. This intervention increased participants' sense of security, empowerment, and confidence, reducing depression and anxiety. These findings are consistent with a previous study that emphasized the importance of individual education programs for post-CABG patients, particularly when preparing them for discharge (Rushton et al., 2017). Another study by Akbari and Celik (2015) also supported the effectiveness of pre-discharge training and counseling in reducing post-hospitalization problems among patients post-CABG. Additionally, it has been found that post-CABG patients who engage in a home exercise program can improve long-term adherence through self-management (Kulik et al., 2015).

It is also noted that the experimental and control groups had an average monthly income ranging from 15,000 to 30,000 baht (396.41 - 792.81 USD) (50%). Both groups were covered by government-subsidized health insurance, which exempted them from financial obligations related to referral, enrollment, and adherence to early outpatient programs (American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR), 2020). Moreover, the availability of healthcare services to all Thai citizens has enhanced the accessibility of cardiac rehabilitation (National Health Security Office (NHSO), 2022). However, despite the financial support and accessibility of services, adherence to exercise was still low. Further investigation is needed to identify the specific reasons underlying low exercise adherence in this context.

The study results also demonstrated that the experimental group exhibited superior self-management compared to the control group. Furthermore, it was observed that a majority of participants in both groups were married, which is a common characteristic in Thai culture, where individuals often reside with their extended families. To enhance the program's effectiveness, nurses could have incorporated coaching and skill training specifically targeting exercise adherence. Additionally, four telephone follow-ups, each lasting 10-15 minutes (Bikmoradi et al., 2017), were conducted to provide ongoing support and address participant feedback or inquiries via the LINE application, enabling better adherence to self-care. This approach aligns with the findings of Bazargani et al. (2011), who highlighted the effectiveness of remote public health data utilization in tracking patients engaged in self-managed rehabilitation programs and utilizing distant public health services for post-CABG follow-up, resulting in increased adherence and self-efficacy.

The significant difference in the post-test exercise adherence score between the experimental and control groups, as indicated by the independent t-test, supports the existing literature highlighting the importance of self-management for exercise adherence in patients post-CABG (Kulik et al., 2015). Engaging in a home exercise program following CABG surgery has been shown to enhance long-term adherence through self-management (Miri et al., 2016). Moreover, Chiang et al. (2020) highlighted the potential of distance healthcare programs utilizing the LINE application to deliver information and instructions related to home exercise programs, contributing to strong exercise adherence among post-CABG patients. Therefore, it is crucial to incorporate individual education programs when preparing patients for discharge to optimize their exercise adherence and overall post-CABG recovery (Rushton et al., 2017).

Limitations of the Study and Future Directions
It is important to acknowledge several limitations in this study that may impact the generalizability of the findings. Firstly, the cultural and environmental factors specific to Thailand may limit the applicability of the study results to other contexts. The cultural norms and social dynamics surrounding cardiac rehabilitation and exercise adherence in Thailand might differ from those in other regions or countries. Therefore, caution should be exercised when extrapolating these findings to diverse populations. Another limitation of this study is the relatively brief duration of the intervention. The short timeframe may have influenced exercise adherence as assessed by self-

reports, which are prone to participant bias and inaccuracies. A longer intervention period would have allowed for a more comprehensive evaluation of exercise adherence and its sustainability over time.

Nevertheless, the study findings demonstrate the effectiveness of delivering the self-management program to patients two days before discharge to enhance post-CABG exercise adherence. This suggests that implementing self-management training as part of the pre-discharge routine can be a valuable strategy for promoting long-term exercise adherence among post-CABG patients. Future research should focus on evaluating the long-term effectiveness of the program in improving exercise adherence beyond the immediate post-discharge period.

Furthermore, it is crucial for nurses, clinicians, and clinical researchers to assess the program's impact on various clinical outcomes, such as symptom management, re-hospitalization rates, and the overall quality of life among post-CABG patients. By examining these aspects, a comprehensive understanding of the program's benefits and potential limitations can be obtained, guiding further refinements and improvements in post-CABG care.

Implications of this Study to Nursing Practice
This study has several implications for nursing practice: First, the study findings highlight the importance of individual education programs for post-CABG patients in improving exercise adherence. Nurses should prioritize developing and implementing tailored education programs that enhance patients' exercise knowledge and skills. This can be achieved through methods such as telephone follow-ups, the use of mobile applications like LINE, and coaching sessions targeting exercise adherence. By providing patients with the necessary knowledge and skills, nurses can empower them to take charge of their own health and promote long-term adherence to exercise regimens.

Second, preparing post-CABG patients for discharge is a critical phase where nurses can play a pivotal role. The study findings support the effectiveness of pre-discharge training and counseling in reducing post-hospitalization problems and improving exercise adherence. Nurses should incorporate comprehensive training and counseling sessions that address exercise adherence, self-management techniques, and the management of post-CABG symptoms. By providing patients with the necessary resources and support before they leave the hospital, nurses can facilitate a smoother transition to self-care and promote better long-term outcomes.

Third, the use of remote healthcare services, such as telephonic follow-ups and mobile applications, can significantly enhance exercise adherence among post-CABG patients. Nurses can leverage these technologies to provide ongoing support, address patient concerns, and reinforce self-management strategies. Integrating remote healthcare services into post-CABG care allows for continuous monitoring, education, and guidance, thus promoting sustained exercise adherence and self-efficacy. Nurses should familiarize themselves with these tools and incorporate them into their practice to optimize patient outcomes.

Fourth, recognizing and respecting cultural factors influencing exercise adherence is crucial in nursing practice. Thai culture, for example, often involves individuals living with

extended families, which may impact exercise routines and adherence. Nurses should be sensitive to the unique cultural context of their patients and tailor interventions accordingly. Engaging family members in the education and support process can also contribute to better exercise adherence and overall patient well-being.

Conclusion

This study sheds light on the significance of implementing a self-management program to enhance exercise adherence among post-coronary artery bypass graft (CABG) patients. The findings emphasize the effectiveness of interventions delivered through telephone and mobile applications, such as LINE, in improving participants' exercise knowledge, skills, and self-care practices. The regular video calls provided crucial monitoring and coaching, resulting in increased confidence in independent exercise. As a result, participants acknowledged the importance of exercise adherence and sustained their exercise routines to enhance their overall health outcomes. These findings have important implications for nursing practice, emphasizing the need for nurses to utilize these strategies to improve patient care.

Declaration of Conflicting Interest

The authors declared no potential conflict of interest in this study.

Authors' Contributions

All authors contributed to the study design, data collection, data analysis, interpretation, drafting of the article, and critical revision. All authors were accountable in each phase of the study and approved the final version of the article to be published.

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Data Availability

Datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Declaration of Use of AI in Scientific Writing

None.

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