

Feasibility and Preliminary Effectiveness of a Transitional Care Program on Cardiac Self-Efficacy and Transitional-Care Knowledge Among Patients Awaiting Elective Coronary Artery Bypass Graft: A Pilot Randomized Controlled Trial

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ABSTRACT

Background: Patient who are going to undergo CABG surgery face stressful situations that affect their cardiac self-efficacy and recovery. TCPs that link hospital and home environments can make a difference in their self-management and psychological functioning.

Aim: Feasibility and preliminary effects of a nurse-led TCP in improving transitional care knowledge, cardiac self-efficacy, depression, anxiety, and stress of patients undergoing CABG surgery in India.

Methods: This parallel-group pilot randomized controlled study included 20 adults who needed a CABG procedure. Participants were assigned randomly to receive either TCP intervention along with usual care (10 subjects) or usual care alone (10 subjects). The TCP comprised educational activities regarding lifestyle modification, stress management (through yoga and breathing techniques), and drug compliance. Measurements were taken before and after the intervention through a transitional-care knowledge scale that consisted of 40 items, Cardiac Self-Efficacy Scale of 13 items, and Depression, Anxiety, and Stress Scale (DASS-21).

Results: All 20 subjects who had been randomized successfully went through both the pre- and post-test measures within a span of 7 weeks, thus establishing high feasibility of this research project. After conducting the intervention session, the experimental group showed improvement with respect to their transitional care knowledge (decrease in poor knowledge from 6 to 1 member). The participants in the experimental group had shown a marked increase in their cardiac self-efficacy scores (pre-test 17-29 and post-test 20-41), while the control group had low-to-moderate scores (pre-test 15-31 and post-test 15-34). Furthermore, the experimental group showed favorable shifts toward milder depression and reduced severe stress and anxiety, outperforming the control group.

Conclusions: The nurse-led TCP was highly feasible and demonstrated positive trends towards improvement in transitional care knowledge, cardiac self-efficacy, and psychological well-being. A fully powered randomized control trial is needed.

Keywords: coronary artery bypass graft; transitional care; cardiac self-efficacy; depression; anxiety; stress; randomized controlled trial; pilot study.

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INTRODUCTION

Cardiovascular diseases (CVDs) continue to be the leading cause of death worldwide, accounting for 19.8 million deaths each year, and making up approximately one-third of all deaths worldwide [1]. The coronary artery disease itself accounts for 17.8 million deaths each year, being the cause of a huge burden of mortality, morbidity, disability, and health care costs [1]. Coronary artery bypass grafting remains one of the commonest surgeries used for treating CAD and the

most common cardiac surgery procedure, with a significant volume of cases described in North America, Europe, and Asia [2; 3].

While CABG provides significant benefits in terms of patient longevity and well-being, the time leading up to

an elective operation is usually marked by physical stress and mental distress, such as depression, anxiety, stress, impaired sleep quality, and poor functional state [4; 5]. These factors could have negative influence on adherence to the treatment, perioperative risks,

recovery, and the overall prognosis of patients [4]. Fears related to an impending operation, uncertainty about the outcome, as well as concerns regarding recovery, make patients feel powerless and lack heart self-efficacy [6; 7].

Cardiac self-efficacy refers to an individual's confidence in their ability to monitor, control, and handle their own cardiac symptoms, engage in the necessary behaviors, and emotionally cope with the disease [8]. Increased self-efficacy is related to healthy behaviors, improved emotional health, and higher quality of life after heart-related experiences [9; 10]. Low self-efficacy, on the other hand, leads to poor adherence, inappropriate coping mechanisms, and greater risks of experiencing adverse events [11; 5].

Interventions that incorporate elements of transitional care are multidisciplinary approaches involving both hospital-based and post-discharge activities and targeting the continuity of treatment, increased patient/caregiver self-management abilities, and decreased fragmentation of care at transition points [11; 12]. These interventions often involve patient assessment before discharge, education, discharge planning tailored to the needs of each patient, and post-discharge follow-up with the help of telephone calls, home visits, or online communication [13; 14]. Transitional care among cardiac patients leads to decreased anxiety and depression levels, increased cardiac self-efficacy and satisfaction with care, and reduced readmission rates [6; 7; 14].

For patients who are waiting for their elective CABG, a program known as Transitional Care Program (TCP) will provide an organized and patient-centered educational, emotional, and counseling intervention that will empower the patient in modifying their lifestyle and adherence to treatment [13; 15]. A study conducted in a randomized group of people undergoing CABG demonstrated that those receiving the TCP with telephone follow-up intervention had lower anxiety and depression, greater cardiac self-efficacy, and greater satisfaction compared to those undergoing regular care [6]. However, limited data exists about the role of transitional-care interventions in LMICs, where little is known about the knowledge of transitional care among those patients waiting for their CABG [16].

Although many CABG procedures occur yearly in India, which amounts to approximately 25,000, psychosocial and educational support prior to the operation is still fragmented. Often, the patients suffer persistently from their symptoms such as chest pain, shortness of breath, fatigue, poor mood, and anxiety even after being discharged [4; 13].

In this scenario, a nurse-led TCP was established in a tertiary care hospital in Belagavi, Karnataka, India, with the intention of managing psychological distress, improving cardiac self-efficacy, and providing

transitional-care knowledge for patients scheduled for elective CABG. This pilot RCT was conducted as part of a PhD program to investigate the feasibility and efficacy of the intervention.

Study aim

The main purpose of this randomized control trial pilot study was to assess the feasibility and initial efficacy of a TCP on cardiac self-efficacy and transitional care knowledge in individuals undergoing CABG surgery. Other objectives included determining the impact of a TCP on levels of depression, anxiety, and stress, as well as developing data to help in designing future trials.

Methods

Study design and setting

A parallel-group, pilot, randomized control trial evaluation was carried out at a tertiary-level care hospital in Belagavi, Karnataka, India. This pilot study was done within an approved research program for a doctorate degree under the Faculty of Nursing of KLE Academy of Higher Education & Research. Pilot data collection was performed from 8 October to 28 November when eligible patients undergoing elective CABG were identified.

Participants

Inclusion criteria

- Patient aged 18 years or older.
- Patients were awaiting elective Coronary Artery Bypass Grafting (CABG) surgery.
- Patient had controlled comorbidities such as diabetes mellitus and hypertension.
- Patient was able to communicate and had no speech or hearing impairments.
- Patient provided written informed consent to participate in the study.

Exclusion criteria

- Patients were critically ill at the time of screening.
- Patients had significant hearing impairment that would preclude participation in the educational sessions.

Sample size and pilot rationale

The main randomized trial was planned with a sample size of 132 participants (66 per arm), calculated using the formula $n = 2S^2(z_{1-\alpha} + z_{1-\beta})^2/d^2$ with a type I error of 5% ($z_{1-\alpha} = 1.96$), 85% power ($z_{1-\beta} = 1.037$), a margin of error of 3.40, and pooled standard deviation derived from prior data, with an additional 20% added to account for potential loss to follow-up [15]. Prior to commencing the main trial, a pilot study with 20 participants (10 per group) was undertaken to assess the feasibility of recruitment, randomization, intervention delivery, data-collection procedures, and acceptability of outcome measures.

Randomization and allocation

After taking consent and gathering baseline

information, subjects were randomly assigned into the experimental (TCP plus conventional treatment) and control (conventional treatment only) groups using the chit technique. For this process, two pieces of chit labeled as “E” and “C,” meaning experimental and control, respectively, were used. In this regard, each consensual subject selected one chit that would assign him/her into any of these groups. The method is quite practical in the context of the busy surgical ward, albeit failing to guarantee allocation concealment.

Intervention: Transitional Care Program

The TCP was designed by the researcher following an exhaustive review of the literature, consultations with experts from the fields of cardiology, psychiatry, physiotherapy, and medical-surgical nursing, and the theories of self-efficacy and transitional care [8; 11; 13]. The content validity was determined through a panel of nine experts (a cardiac consultant, a physiotherapist, a psychiatrist, and six medical-surgical nursing experts); some adjustments were made based on their comments prior to the pilot study.

The delivery of the TCP involved a nurse-led education and counseling program that comprised a PowerPoint presentation and personal interviews. Some essential elements were:

- **Lifestyle modification:** Educating patients about the significance of engaging in regular, proper physical activity according to their condition.
- **Dietary modification:** Providing advice about healthy eating habits for the heart, such as cutting down on saturated fats and sodium while increasing fruit and vegetable intake.
- **Weight loss:** Offering advice about achieving proper weight.
- **Cessation of smoking and alcohol drinking:** Educating about the risks of using tobacco and alcohol and quitting these bad habits.
- **Stress reduction:** Teaching meditation, yoga, deep-breathing techniques, and anulom vilom breathing to lessen stress and anxiety levels.
- **Drug therapy:** Educating about drug prescriptions, doses, side effects, and adherence to treatment.
- **Follow-up visits and warning signs:** Encouraging follow-up visits and educating patients about warning signs that should be reported immediately [13; 14].

Educational classes were held during the pre-operative hospitalization period and continued postoperatively as part of the larger doctoral study. In the pilot study, feasibility of the delivery of the first pre-operative educational class as well as the collection of post-test data during the index hospitalization period was determined.

Control condition

Individuals belonging to the control group were given routine hospital treatment. This would usually consist of regular pre-surgical counseling done by the surgeons and nurses as well as routine post-surgery instruction, but not the aspects of the TCP mentioned above.

Outcome measures

Socio-demographic and clinical characteristics

The structured demographic questionnaire was employed to obtain participants' socio-demographic information (e.g., age, gender, educational status, marital status, etc.) as well as their clinical information, for example, comorbidities.

Transitional-care knowledge

The transitional-care knowledge test was carried out using a self-designed and self-administered knowledge-based transitional care questionnaire that had 40 questions with each question being rated using a 5-point Likert scale. The total possible score was between 0 and 160, where scores of 0 to 53 indicated poor knowledge, 54 to 106 indicated average knowledge, and 107 to 160 indicated good knowledge.

Cardiac self-efficacy

Cardiac self-efficacy was assessed through a 13-item Cardiac Self-Efficacy Scale, with individual items scored on a 5-point Likert scale. High levels suggest increased self-confidence regarding cardiac symptom control and activity engagement. In the current research, scores obtained during pilot testing were found to fall within the lower to middle ranges of self-efficacy levels [9].

Depression, anxiety, and stress

The level of depression, anxiety, and stress was measured using the Depression, Anxiety and Stress Scale (DASS-21). This is a structured test involving 21 questions with three subscales, each comprising 7-questions, and scored using a Likert scale of four points [17]. The subscale scores were classified from normal to extremely severe using cut-offs.

Data collection procedures

Data collection was conducted in two phases: before surgery and after surgery.

Before surgery:

1. Eligible subjects were recruited and enrolled; informed consent in writing was taken from them.
2. The socio-demographic and clinical information of each participant was gathered through a demographic form.
3. Pre-test measurement of transitional care knowledge, cardiac self-efficacy, and the DASS-21 scales was carried out at the first day of their admission to the hospital in about 20-40 minutes per person.
4. TCP was administered to subjects in the experimental group.

- The first post-test measurement was carried out 3 days after the pre-test.

After surgery:

- Another post-test was scheduled one week after the surgery.
- The TCP intervention was reiterated during each follow-up session.
- Another post-test was scheduled one month after the surgery [14].

In this pilot study, the attention was paid to the feasibility indicators and changes before and after the intervention within the first admission period.

Feasibility outcomes

The feasibility results that were examined in the pilot trial included the recruitment rate, which was based on the number of patients found suitable for the study and who gave their consent to take part. Another area evaluated was whether randomization was possible using the chit technique at the clinical site. Moreover, the baseline and post-test questionnaire completion rates were also considered for assessing participant compliance with the study. The time taken by participants to complete the research measures and the TCP session was documented for practical considerations.

Statistical analysis

Descriptive statistics were employed for the presentation of socio-demographic data and results, consisting of frequency distribution, percentages, minimum/maximum values, and ranges observed in the pilot study. For the primary trial, it is expected that inferential statistics will be used, such as Chi-square tests for associations, and repeated-measures ANOVA with relevant post-hoc tests, setting statistical significance levels at $p < .05$; however, no power calculations have been conducted to conduct any hypotheses testing in the pilot [15].

Results

Participant flow and feasibility

In the 7 weeks period from 8 October to 28 November, twenty patients scheduled for elective CABG surgery agreed to join the experiment and were randomly allocated into experimental group ($n = 10$) and control group ($n = 10$) based on chit method (**Figure 1**). All 20 subjects managed to undertake pre- and post-intervention measures without difficulty, suggesting satisfactory feasibility of recruiting participants and undertaking randomization and data collection process. The duration for filling out questionnaires took 20 to 40 minutes.

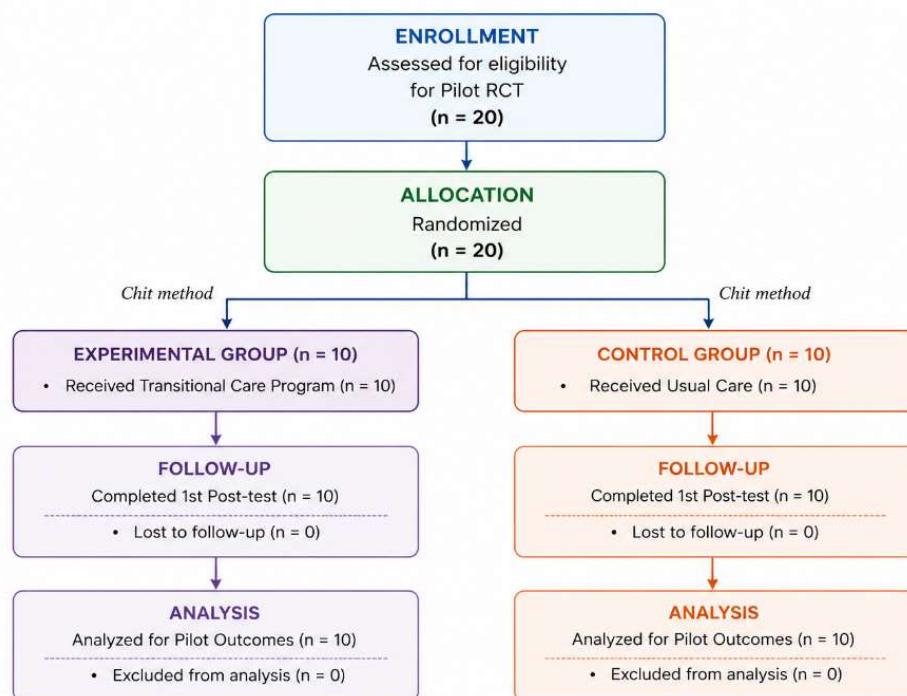


Figure 1. Flow diagram of participant recruitment, allocation, and follow-up in the pilot randomized controlled trial.

Transitional-care knowledge

Prior to any intervention, most individuals within both groups exhibited weak knowledge about transitional care pertaining to CABG surgery and self-management after discharge. For the experimental group, 60 percent

had weak knowledge while 40 percent had average knowledge. After the implementation of the TCP, there was a remarkable difference, wherein 80 percent of the experimental subjects were able to increase their knowledge from average level, 10 percent gained good

knowledge, while 10 percent still maintained low-level knowledge (see Figure 2). On the other hand, in the control group, the knowledge level of the majority did not change much since there were only minimal

differences from baseline to post-test scores, wherein 70 percent still had weak knowledge while 30 percent were at the average level (see Table 1).

Table 1. Transitional-care knowledge categories pre- and post-intervention by group in the pilot randomized controlled trial (n = 20).

Group	Time	Poor n (%)	Average n (%)	Good n (%)
Experimental	Pre-test	6 (60)	4 (40)	0 (0)
Experimental	Post-test	1 (10)	8 (80)	1 (10)
Control	Pre-test	7 (70)	3 (30)	0 (0)
Control	Post-test	6 (60)	4 (40)	0 (0)

These descriptive findings indicate that the TCP helped produce significant short-term gains in transitional care knowledge among patients awaiting CABG surgery, in addition to those obtained from standard preoperative education [13; 15].

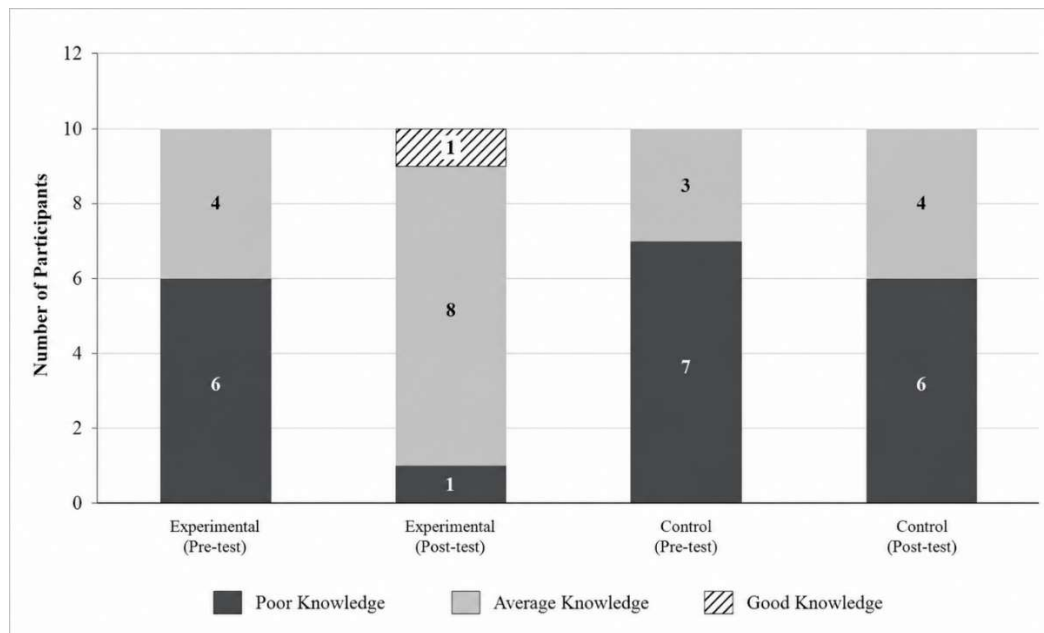


Figure 2. Distribution of transitional-care knowledge categories pre- and post-intervention by group.

Cardiac self-efficacy

Scores of pre-test cardiac self-efficacy were between 15 and 31, and those of post-test were between 15 and 34, which suggest low to moderate self-efficacy in the control group. This suggests that patients have limited to average self-confidence when dealing with their cardiac symptoms as well as daily activities in ordinary

health settings. For the experimental group, scores of pre-test were between 17 and 29, and scores of post-test were increased between 20 and 41 (Table 2). All subjects had moderate self-efficacy, and one subject had high self-efficacy score of 41 while none of subjects showed extremely low self-efficacy at post test.

Table 2. Cardiac self-efficacy score ranges by group and time point (n = 20).

Group	Time	Minimum score	Maximum score	Observed range	Interpretation*
Experimental	Pre-test	17	29	17–29	Moderate self-efficacy

Experimental	Post-test	20	41	20–41	Moderate to high self-efficacy
Control	Pre-test	15	31	15–31	Low to moderate self-efficacy
Control	Post-test	15	34	15–34	Low to moderate self-efficacy

*Interpretation based on the Cardiac Self-Efficacy Scale guidelines and prior literature [9]. Even without any statistical comparisons being made, the increase in the level of self-efficacy scores, especially the rise in high self-efficacy levels among the experimental group, aligns well with the effects of the TCP based on self-efficacy principles [8].

Depression, anxiety, and stress

As seen from the results derived through the use of the DASS 21 tool, the participants in both groups showed signs of depression, anxiety, and stress in differing levels before the start of the experiment. Most of the

participants of the experimental group demonstrated a moderate level of depression prior to the experiment, which became milder after the experiment. The same was observed for anxiety and stress. The control group did not show much difference (see Table 3).

Table 3. DASS-21 severity categories pre- and post-intervention in experimental and control groups (n = 20).

Subscale	Group	Category	Score range	Pre-test n	Post-test n
Depression	Experimental	Normal	0–9	0	0
		Mild	10–13	1	6
		Moderate	14–20	9	4
		Severe	21–27	0	0
		Extremely severe	≥28	0	0
	Control	Normal	0–9	0	1
		Mild	10–13	3	3
		Moderate	14–20	5	5
		Severe	21–27	2	1
		Extremely severe	≥28	0	0
Anxiety	Experimental	Normal	0–7	0	0
		Mild	8–9	1	1
		Moderate	10–14	1	3
		Severe	15–19	4	5
		Extremely severe	≥21	4	1
	Control	Normal	0–7	0	0
		Mild	8–9	1	1
		Moderate	10–14	1	2
		Severe	15–19	3	4
		Extremely severe	≥21	5	3
Stress	Experimental	Normal	0–14	3	2
		Mild	15–18	1	5
		Moderate	19–25	4	3
		Severe	26–33	2	0
		Extremely severe	≥34	0	0
	Control	Normal	0–14	0	0
		Mild	15–18	2	3
		Moderate	19–25	4	4
		Severe	26–33	4	3
		Extremely severe	≥34	0	0

The above-mentioned results correlate with the trend of lower psychological distress among subjects exposed to the TCP intervention than among those receiving standard care, which should be viewed with caution considering the small scale of the pilot study and the lack of inferential analysis [7; 14].

Discussion

The current randomized control trial piloted the feasibility and effectiveness of the TCP intervention on transitional-care knowledge, cardiac self-efficacy, and psychological health status in patients scheduled for elective CABG surgery at a tertiary care hospital in India. It was found that the intervention along with the trial process was feasible and acceptable within the selected environment. Additionally, the TCP intervention has shown clinical relevance to improve transitional-care knowledge and cardiac self-efficacy levels of participants.

Feasibility of the Transitional Care Program

Feasibility of the protocol was established through the successful randomization of 20 participants within a seven-week period, and completion of the baseline and post-intervention assessment was achieved by all participants, indicating that integration of the TCP into pre-operative care practices is feasible. The completion time of between 20 to 40 minutes was acceptable, and the delivery of education by nurses was achievable within the current staff structure. This finding concurs with other studies that have indicated the feasibility of introducing transitional care programs in a busy surgical environment [13].

Given the positive results regarding feasibility, it is justified to move forward with a large-scale study involving 132 patients, which would enable a comprehensive assessment of the impact of the intervention program on patient-centered outcomes and health service usage [14; 15].

Effects on transitional-care knowledge and cardiac self-efficacy

The strongest effect seen in terms of a pre-test to post-test change among participants belonging to the experimental group was noted regarding transitional-care knowledge. They progressed from mostly possessing low knowledge to having average or high knowledge at post-test, while members of the control group improved very little. Increased knowledge about the disease, its treatment, self-care practices, and warning signs constitutes an important pre-condition for successful self-management of the condition [11; 13; 18].

The cardiac self-efficacy was also seen to be enhanced further in the experimental group compared to the control group with the post-test results showing that cardiac self-efficacy levels fell into the high self-efficacy category only for the recipients of TCP. The results align with the self-efficacy theory by Bandura (1997), which highlights that self-efficacy levels can be boosted through performance accomplishments, vicarious experiences, verbal persuasions, and decreased emotional arousal [8]. It could have been due to the individualized teaching, skills training (breathing techniques, managing stress) provided in conjunction

with emotional support, as has been seen in other studies [9; 14; 10].

The above conclusions are consistent with results from one randomized controlled study involving patients awaiting elective coronary artery bypass graft surgery where an integrated approach to transition care including frequent telephone calls decreased the level of anxiety and depression, while improving the heart self-efficacy and patient satisfaction with care services [6]. Moreover, they have been proven by various studies indicating improvement in self-management abilities, self-efficacy, and HRQoL for both cardiovascular and surgical patients [12; 10].

Psychological outcomes

While it was not powered to show statistically significant changes, there was evidence of decreased severity of symptoms in depression, anxiety, and stress from the DASS-21 in those in the TCP arm versus those in the control arm. This result is consistent with existing literature which shows that psychological intervention before surgery, educating patients, and breathing/relaxation exercises can help in reducing anxiety and depression levels as well as improve sleep patterns in CABG patients and patients undergoing any cardiac procedures [4; 19].

Transitional Care models that involve intervention after discharge have also been shown to reduce rates of readmission, improve functional status, and increase satisfaction among the patients [11; 13; 14]. In this sense, the current pilot study adds to the existing literature in its focus on the preoperative period in CABG patients in the Indian setting while including both educational as well as psychological components within the Nurse-led TCP.

Implications for nursing practice and cardiac care

The results underscore the crucial importance of nurses in the design and implementation of transitional care programs for cardiac surgery patients [13; 18]. Nurses have the advantage of evaluating the learning needs of patients, providing relevant information, teaching self-management techniques, and providing emotional support to patients throughout the perioperative period [13; 20; 21].

In environments where resources are limited, nurse-directed TCPs can be effective and inexpensive by using existing staff and basic educational aids (such as slides, handouts, and phone calls) to help patients benefit from such programs [12; 14]. Customizing the programs in terms of language, culture, and healthcare practices—as done in this study—will increase their appropriateness.

Strengths and limitations

There are many strengths associated with this pilot trial. It adopted a randomized design, involved the use of reliable tools to measure cardiac self-efficacy and psychosocial variables, and involved a TCP grounded

on theoretical principles led by nurses and formulated based on expert opinions and a review of existing literature [8; 11; 13]. In addition, the trial filled a critical gap regarding the preoperative phase of CABG patients in LMICs.

Nonetheless, there are significant weaknesses that should not be overlooked. Firstly, the sample size was too small ($n = 20$), which makes the results less generalizable and makes inferential statistics inappropriate, and any findings can only serve as a basis for future research. Secondly, the randomization strategy employed was relatively weak and involved the drawing of chits, meaning that it may have exposed the study to selection bias. Thirdly, the socio-demographic and clinical profile of participants was not provided, making it difficult to determine group comparability.

Fourth, although the aim of the TCP was to extend beyond the postoperative and discharge periods, the current study of the pilot was limited to examining only the pre-intervention/post-intervention impact of the program within the index hospital stay, with no further assessment of outcomes like readmission at 30 days, quality of life, or long-term self-efficacy [6; 14]. Fifth, the outcomes measurement was based on self-report measures that could be biased.

Directions for future research

A randomized controlled trial that is sufficiently powered to include 132 subjects is needed to properly assess the effectiveness of the TCP on transitional care knowledge, cardiac self-efficacy, depression, anxiety, stress, readmission rates, and quality of life before and after CABG [14; 15]. This study would involve the use of adequate randomization and allocation concealment techniques, predetermined analysis plans, and methods to ensure minimal dropouts.

Future studies could also:

- Determine the relative impact of each element of the TCP (such as preoperative education versus postoperative telephone or telecommunication follow-up) on its effectiveness [6; 14].
- Use technological advances in the form of mobile phone applications for remote patient management to improve the dissemination of the TCP [10; 14].
- Conduct an economic evaluation and assess implementation factors (including adherence, acceptability, and sustainability) to facilitate wider adoption at different cardiac centers [12].
- Engage patients and caregivers to obtain information about their perceived transitional care needs and experiences [21; 20].

Conclusion

The pilot randomized controlled trial revealed that nurse-led Transitional Care Program for patients waiting for elective CABG at a tertiary care hospital in India is feasible and acceptable to the study participants. The descriptive analyses suggest positive

trends towards better transitional care knowledge, cardiac self-efficacy, and decreased levels of depression, anxiety, and stress amongst the participants in the TCP group compared to the patients in the control group, who were only provided with the usual care.

Considering the evidence obtained and further evidence collected through international research on transitional care among cardiac patients, it is possible to justify the need to conduct a large scale study in order to validate the results and evaluate the effects of the program on patients and health services as well.

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