

Effectiveness Of An Instructional Program Regarding Early Mobilization On Physical Status And Length Of Stay For Patients After Open Heart Surgery

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Abstract

Background: Open heart surgery is associated with significant postoperative complications, including reduced physical function and prolonged hospital stay. Early mobilization has been increasingly recognized as a key component of postoperative care aimed at improving recovery outcomes.

Aim: Determine the effectiveness of an instructional program about early mobilization on patient physical status and length of stay in hospital by comparing the results between the study and control groups after open heart surgery.

Methods: This quasi-experimental study was conducted on 102 patients scheduled to undergo cardiac surgery. Participants were divided into two groups: an experimental group and a control group. The experimental group included 60 patients who received an early mobilization program in addition to routine postoperative care, while the control group consisted of 42 patients who received routine hospital care only.

Results: The findings demonstrated a statistically significant improvement in physical status among patients in the experimental group over the three-day postoperative period. Compared to the control group, patients who received the early mobilization program showed a higher level of physical recovery with a high statistically significant difference.

Conclusion: The early mobilization program demonstrated a significant positive impact on improving the physical status of patients undergoing cardiac surgery within the first three postoperative days. Patients in the experimental group showed faster functional recovery compared to those receiving routine care only. These findings highlight the effectiveness of early mobilization as an essential component of postoperative cardiac care.

Key words: Cardiac surgery, instructional program, early mobilization, physical status, length of stay.

1. Introduction

Open heart surgeries are crucial and become more complicated in reducing patient complaints, enhance heart functional capability, improve prognosis, and minimize discomfort [1-3].

Patients undergoing cardiac surgeries are believed to be at a higher risk than those undergoing other surgeries due to their unstable hemodynamic state, and they are often released from surgery with a variety of catheters, lines, and chest tubes [4].

Prolonged immobilization in intensive care unit (ICU) result in functional decline and heighten the risk for hospital-associated complications such as falls and pressure ulcers [5].

According to Honda et al. (2024), there are a strong correlation between postoperative functional decline and longer hospital stays and slower recovery, highlighting the importance of early interventions intended to preserve physical capacity after surgery [6].

Mobilization reduces the length of stay (LOS) of patients in the ICU and hospital by improving respiratory functions and early extubation, supporting the cardiovascular system, preventing problems from immobilization, and improving psychological well-being. Even yet, most patients find early mobilization to be safe and well-tolerated Mobilization for patient with cardiac surgery in ICU include active-passive range of motion (ROM) exercises, changing positions, raising the head of the bed, turning in the bed, sitting by the bed, moving from the bed to chair, standing, and walking activities [7].

The importance of patient education in postoperative management was influenced by demonstrating that educational intervention had a significant impact on patients' mobilization behaviors, which are linked to improved functional outcomes and reduce hospital stays [8]. Therefore, Patient outcomes, such as functional ability, length of hospital stay, and complication rates, are greatly influenced by postoperative open heart surgery management [9].

1.1. Objective of the Study

Determine the effectiveness of an instructional program about early mobilization on patient physical status and length of stay in hospital by comparing the results between the study and control groups after open heart surgery.

2. Methodology

2.1. Design of the Study

The quasi-experimental design has been used in this study to determine the effectiveness of an instructional program of early mobilization on improving physical status and length of stay in hospital by comparing the results between the study and control groups after open heart surgery.

2.2. Setting of the Study

This experimental study was carried out over five months' period from 4th November 2025 to 31 March 2026. The data were collected from surgical department (ICU, and Step down unit) in Al-Najaf Center for Cardiac Surgery and Cardiac Catheterization / Al-Najaf Health Directorate/ Al-Najaf Al-Ashraf City.

2.3. Sample and Sampling of the Study

A non-probability purposive sampling technique was used to select 102 patients who planned to undergo elective cardiac surgery and referred to AL-Najaf Center for Cardiac Surgery and Cardiac Catheterization during the study period. The sample of the present study consisted of 102 patients who underwent open heart surgery and were admitted to the cardiac surgery unit. The participants were distributed into two groups, with 60 patients in study group and 42 patients in control group. Study group received the instructional program regarding early mobilization. In contrast, the group (Control Group) received the routine hospital care without exposure to the instructional program.

2.4. Study Instrument

Part I: Socio-Demographic Data: The first part of the instrument collected the socio-demographic information obtained from the patients after open heart surgery using interview. This part included (5) items such as: (age, sex, level of education, working status, and residence).

Part II: The Clinical Characteristics: The second part of instrument was consisted of (5) items of participant's clinical characteristics. The characteristics datasheet collected from patients' medical records and interview. This part included the following (5) items. It begins with the approach of surgery, which identifies the surgical approach used, either sternotomy or minimally invasive cardiac surgery (MICS). It also includes the type of surgery, categorized as coronary artery bypass graft (CABG), valve surgery, CABG combined with valve surgery, or other cardiac procedures, such as atrial septal defect (ASD), ventricular septal defect (VSD), and tetralogy of Fallot (TOF) repair. In addition, this section determines whether the surgery was performed on-pump or off-pump cardiopulmonary bypass. The presence of chronic comorbid diseases is also assessed (Yes/No). If present, the specific condition is identified, including diabetes mellitus (DM), hypertension, chronic obstructive pulmonary disease (COPD), or other chronic diseases. Furthermore, the instrument evaluates the patient's smoking status, categorized as active smoker, ex-smoker, passive smoker, or non-smoker. Finally, the body mass index (BMI) is calculated for each patient based on measured height and weight.

Part III: Physical Activity Assessment: Part three of the study instrument was designed to assess the level of physical activity among patients following open heart surgery during their stay in the intensive care unit (ICU). In this study, physical activity was evaluated using the Intensive Care Unit Mobility Scale (IMS). The IMS is a standardized and validated tool developed by Hodgson et al. (2014) to measure the mobility status of critically ill patients in the ICU. The scale consists of 11 levels ranging from 0 to 10, where 0 indicates no active movement (lying in bed) and 10 indicates independent ambulation without assistance [10]. The IMS is widely used in clinical practice and research to objectively assess patient mobility and monitor the progression of physical activity during hospitalization. In the present study, the IMS was used to determine the patients' mobility level after cardiac surgery and to evaluate changes in their physical activity status during the implementation of the early mobilization program.

Part IV: Length of Stay: Part four of the study instrument was designed to measure the length of hospital stay among patients undergoing open heart surgery. In this study, the length of stay was divided into two categories: length of stay in the hospital and length of stay in the intensive care unit (ICU).

2.5. Ethical Considerations and official Agreements

Upon submission of study protocol, a formal approval sheet granted to the researcher to precede the study with human subjects from Medical Ethics Committee (MEC), College of Medicine, University of Kufa. The researcher submitted detailed description

about the study and questionnaire to Al-Najaf Al-Ashraf Health Directorate in order to obtain official permission to conduct the study. Before the data collection, the researcher interviewed each participant and explained the study purposes; benefits; and potential risks, then personal agreement obtained from the participant themselves and signing on informed consent. The researcher explained to the participants that the engage is voluntary, they have the right to reject the participation in the study at any time before and during the study, and privacy and confidentiality of the personal information were respected.

2.6. Data Collection

The data collection process extended from November 4th 2025 to March 31st 2026. To evaluate the effectiveness of the instructional program regarding early mobilization on patients after open heart surgery, the intervention was initiated postoperatively on day one (within hours after surgery). The program was implemented for three consecutive days for the intervention study group. Patients' physical status was assessed and monitored daily using IMS.

2.7. Implementation of Study Program

Implementation of the Instructional Program of the early mobilization program was initiated within approximately 10–12 hours following extubation. On day one, the intervention included passive and active range of motion exercises for both upper and lower extremities, along with respiratory exercises using an incentive spirometer. Patients were encouraged to maintain an upright sitting position, progressing from sitting in bed to sitting at the edge of the bed, and subsequently transferring to a chair with sternal support. Patients remained seated for 15–30 minutes and were further encouraged to perform standing and marching in place as tolerated. On day two, patients were encouraged to ambulate for a distance of 20–40 meters while continuing upper and lower extremity exercises. By day three, ambulation distance was progressively increased to 40–60 meters and up to 60–90 meters based on patient tolerance, with additional encouragement to perform activities of daily living independently, such as eating and toileting.

3. Results

Table (1): Statistical Comparison of Physical Activity (Mobilization) Levels between the Study and Control Groups across three days after open heart surgery using independent t test & repeated measures ANOVA test.

Physical Activity		Study (n=60)	Control (n=42)	Independent t test		
		Mean ± SD	Mean ± SD	t test	P value (Sig.)	Effect Size %
Mobilization Levels	D1	4.70 ± 1.08	2.93 ± 1.11	8.058	<0.0001 (HS)	87.4
	D2	6.65 ± 1.16	4.14 ± 0.93	11.631	<0.0001 (HS)	95.1
	D3	8.38 ± 1.25	5.48 ± 0.94	12.739	<0.0001 (HS)	96.5
Repeated measures ANOVA	F test	524.28	197.82			
	P value (Sig.)	<0.0001 (HS)	<0.0001 (HS)			
	Post Hoc Analysis	D1<D2<D3	D1<D2<D3			
	Effect Size %	99.9	97.7			

D=Day, SD= Standard deviation, P = probability value. HS= high Significant at (P < 0.01).

Table (1) showed a highly significant improvement in physical activity (mobilization) levels among patients in the study group compared with the control group across the three postoperative days after open heart surgery. The study group consistently achieved higher mean mobilization scores on Day 1 (4.70 ± 1.08 vs. 2.93 ± 1.11), Day 2 (6.65 ± 1.16 vs. 4.14 ± 0.93), and Day 3 (8.38 ± 1.25 vs. 5.48 ± 0.94), with all between-group differences being highly statistically significant (P < 0.0001). The independent t-test values increased progressively from Day1 to Day 3. Repeated measures ANOVA with a Greenhouse-Geisser correction also revealed highly significant within-group changes in both groups (P < 0.0001), with post hoc analysis confirming a steady increase in mobilization levels from Day 1 to Day 3 (D1 < D2 < D3).

Table (2): Statistical Comparison of Overall Physical Activity (Mobilization) Level between the Study and Control Groups after Open Heart Surgery using independent t test.

Physical Activity		Study (n=60)	Control (n=42)	t test	P value (Sig.)	Effect Size %
		Mean $\pm$ SD	Mean $\pm$ SD			
Mobilization	Overall, the three Days	6.58 $\pm$ 1.05	4.18 $\pm$ 0.87	12.136	<0.0001 (HS)	95.8

P = probability value. HS= high Significant at (P < 0.01).

Using an independent t test, table (2) showed a highly significant improvement in overall physical activity (mobilization) level among patients in the study group compared with the control group after open heart surgery. The study group consistently achieved higher mean mobilization scores (6.58 $\pm$ 1.05 vs. 4.18 $\pm$ 0.87), with P < 0.0001. Furthermore, the very high effect sizes suggest that the intervention applied to the study group was highly effective in enhancing mobilization compared with routine care in the control group.

Table (3): Statistical Differences in Length of stay Period between study (n=60) and Control groups (n=42) using independent t test.

Length of stay		Study (n=60)	Control (n=42)	t test statistic	P value (Sig.)	Effect Size %
		Mean $\pm$ SD	Mean $\pm$ SD			
Length of Stay	in ICU (Days)	4.02 $\pm$ 0.95	5.40 $\pm$ 1.04	-7.007	<0.0001 (HS)	95.8
	in HOSP (Days)	5.72 $\pm$ 0.94	7.19 $\pm$ 0.92	-7.869	<0.0001 (HS)	95.8

P = probability value. NS= Non-Significant at (P > 0.05), S= Significant at (P < 0.05), HS= high Significant at (P < 0.01).

Table (3) showed that there is a high significant difference between the study group and the control group in the length of stay in the ICU (P value <0.0001). The study group average was 4.02 days in the ICU. In contrast, the control group average was 5.40 days in the ICU. Similarly, there are a high significant difference between the study group and the control group in the length of stay in the HOSP (P value <0.0001). The study group average was 5.72 days in the HOSP. In contrast, the control group average was 7.19 days in the HOSP. Additionally, the very high effect sizes suggest that the intervention applied to the study group was highly effective in reduce the length of stay in both ICU and HOSP compared with routine stay for the control group.

4. Discussion

The results of the revealed a statistically significant improvement in physical activity levels among patients in the study group compared with the control group across the three postoperative days, as determined by the independent t-test. The study group demonstrated higher mean scores, indicating better physical activity following the implementation of the early mobilization program. In addition, repeated measures ANOVA showed a significant improvement in physical activity levels over time within both the study and control groups from postoperative Day1 to Day2, and Day3, reflecting a progressive recovery pattern after open-heart surgery. Study conducted by Shaheen et al., (2025) showed a prospective randomized controlled trial and reported that early mobilization had a statistically significant positive effect on functional outcomes among post-cardiac surgery patients. Patients in the intervention group exhibited marked improvements in physical performance and recovery progression, reinforcing the current study findings and emphasizing the clinical value of implementing structured early mobilization protocols in postoperative cardiac care [11].

The findings of the present study can be further supported by recent evidence from critical care settings. In this context, Shih (2025) reported that early mobilization among cardiac surgery patients in intensive care units was associated with improved physiological stability and enhanced recovery outcomes. This aligns with the current study results, where patients who underwent early mobilization demonstrated better physical status and recovery progression [9].

Regarding overall physical activity (mobilization) level among patients in the study group compared with the control group after open heart surgery. There is a highly significant improvement in the study group consistently achieved higher mean mobilization scores (6.58 $\pm$ 1.05 vs. 4.18 $\pm$ 0.87), at P < 0.0001. Furthermore, the very high effect size suggest that the intervention applied to the study group was highly effective in enhancing mobilization compared with routine care in the control group. A study conducted by Cordeiro et al., (2022) on patients undergoing open heart surgery demonstrated that early mobilization significantly improves functional capacity and physical activity levels compared to routine care. Patients in the intervention group showed higher levels of physical activity, whereas those in the control group had reduced activity levels and slower recovery [12].

Findings demonstrates a highly significant difference between the study group and the control group regarding the length of stay in hospital in both ICU and ward. The very large effect size indicates that the intervention applied to the study group had a substantial impact in reducing the duration of hospitalization. Patients in the study group experienced shorter period in ICU and overall hospital stays compared to those in the control group, who received routine care, highlighting the importance of early mobilization in improving postoperative recovery. These findings are supported by Raidou et al., (2021), who conducted an observational study on cardiac surgery patients and found that early mobilization was significantly associated with a reduction in ICU length of stay. Patients who were mobilized early had shorter ICU stays compared to those who remained immobilized [13].

5. Conclusion

The main conclusion is that implementing an early mobilization program significantly improves patients' physical status and reduces both ICU and hospital length of stay among patients undergoing open heart surgery compared to those who receive routine nursing care.

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Conflicts of Interest

There are no conflicts of interest.

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