



# International Journal of Nursing and Health Care Science

Review Article

Figueroa C and Lykins A. J Int J Nurs & Healt Car Scie 04: 2024-316

## Implementing An Early Mobility Protocol in Postoperative Cardiac Surgical Patients

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Submission Date: 07 February, 2024

Accepted Date: 07 March, 2024

Published Online: 11 March, 2024

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**How to cite this article:** Figueroa C and Lykins A (2024) Implementing An Early Mobility Protocol in Postoperative Cardiac Surgical Patients. *Int J Nurs & Healt Car Scie* 04(03): 2024-316.

### Abstract

Objective of this study was to evaluate and improve adherence to implementing an early mobility protocol in postoperative cardiac surgery patients. Immobility in postoperative cardiac surgery patients is common in the SICU and has been linked to postoperative complications such as prolonged intubations, pleural effusion, wound infection, stroke, renal failure, pneumonia, uncontrolled pain, and prolonged hospitalization. Many factors inhibit the ability to increase mobility. Currently, there are not an early mobility protocols developed in postoperative cardiac surgical patients in many institutions. Knowledge of the mobility protocol and subsequent adherence is unknown and hypothesized to be low. Small, targeted educational sessions were given to registered nurses in a surgical ICU at an academic center in Northern Florida. Sessions detailed the new early mobility protocol, the importance of implementation, and how to implement it appropriately. 40 audits were performed. Statistical significance was observed in the post-implementation audited areas indicating overall adherence was improved. Compared to the baseline (n=14, 0%), compliance associated with being out of bed within six hours of extubation improved to 92.31%, overall compliance with up to the chair on all postoperative days decreased from 100% (n=14) to 96.15% (n=25), improved compliance with ambulation on postoperative day one from 50% (n=7) to 92.31% (n=24), improved compliance with ambulation on postoperative day two from 69.23% (n= ) to 80.77% (n=21), and improved compliance with ambulation on postoperative day three from 57.12% to 80.77% (n=21). Study concluded that educational sessions improved adherence with early mobility protocols in postoperative cardiac surgery patients.

Early mobility in critically ill patients has elicited attention as an important outcome of cardiac surgery [1,2]. Furthermore, early mobility is essential in the postoperative cardiac surgery patient to improve outcomes and decrease hospital length of stay [3,4]. Conversely, decreased mobility in postoperative cardiac surgery patients may predispose patients to adverse medical outcomes, as well as prolonged hospitalization [5].

**Keywords:** Cardiac surgery; Early mobility; Postoperative complications

### Background and Significance

In 2019, an average of 24,000 adult cardiac surgeries were performed each month, which is roughly 288,000 adult cardiac surgeries per year [5]. The most common postoperative complications after cardiac surgery are prolonged intubation, pleural effusion, wound infection, stroke, renal failure, pneumonia, uncontrolled pain, and prolonged hospitalization [5]. Early mobility in the postoperative cardiac surgery patient decreases postoperative complications, increases functional capacity, and reduces hospital length of stay [4]. Early mobility is essential in postoperative cardiac surgery patients to improve overall outcomes while hospitalized and after discharge [2]. In the Surgical Intensive Care Unit (SICU), mobility tends to be minimized due to the extensive amount of equipment connected to the patient, uncontrolled postoperative pain, and a general lack of knowledge regarding the benefit of early mobility among the nursing staff. There is no current mobility protocol for postoperative cardiac surgery patients in the SICU. Decreased mobility is linked to increased postoperative complications, increased length of hospital stays, and decreased functional capacity postoperatively [6].

Decreased mobility in the SICU is multifactorial but is often associated with staffing levels and the lack of a mobility protocol in the SICU. Additional factors contributing to decreased mobility in the SICU include the patient's hemodynamic stability, increased chest tube output requiring close monitoring, prolonged intubation, and decreased cognitive functioning postoperatively [6,7,8]. There is no mobility protocol to follow for postoperative cardiac surgery patients in the SICU where the patients were evaluated. Mobility is typically patient-driven, depending on what they feel they want to do. For example, if the patient prefers to only get up to the chair the first day after surgery, that is the only activity the patient completes for the day. Therefore, effective interventions to improve early mobilization in postoperative cardiac surgery patients are imperative.

As mentioned, countless factors contribute to decreased mobility in the postoperative cardiac surgery patient, many of which are seemingly impossible to modify, and others rely on the improvement of the patient's underlying condition. However, modifiable factors do exist, and the bulk of these factors depend on the direct actions of the treatment teams (i.e., the timing of therapeutic procedures, adequate staffing, mobility aids, and adequate pain control), to name a few. Therefore, understanding modifiable risk factors for decreased mobility in postoperative cardiac surgery patients is critical to implementing an early mobility protocol.

While many studies examine the numerical cost(s) associated with the deleterious outcomes related to decreased mobility in postoperative cardiac surgery patients, one study by Marcarian et al. [3] demonstrated both a decrease in SICU days and a decrease in hospital length of stay. Although no dollar amount was listed, reducing SICU days and length of hospital stay will inevitably decrease costs to both the patient and the institution. Therefore, implementing an early mobility protocol in postoperative cardiac surgery patients via modifiable factors may lead to decreased postoperative complications, increased functional capacity, and decreased length of hospital stay [4].

## Intended Improvement

### Project Purpose

At a local institution in Northeast Florida, it was hypothesized (secondary to informal observation) that the institution did not have an early mobility protocol for postoperative cardiac surgery patients. Typically, the patient's only form of activity in the ICU is getting up to the chair and returning to bed. The proposed protocol was intended to be implemented by bedside nursing staff and should be adhered to by all hospital staff members regardless of their position.

### Hypothesis

In order to perform the literature search for the project, the clinical question and creating the clinical question was identified. In all postoperative cardiac surgery patients, does nurse education regarding an early mobilization protocol in the Intensive Care Unit, compared to the current standard, affect early mobilization outcomes, within a three-month timeframe?

## Review of Literature

Of the thirteen articles reviewed, five articles [4,7,8,9,10,11] were systematic reviews that evaluated the effects of early mobilization in postoperative cardiac surgery patients and the patients in the Intensive Care Unit. Chen et al. [7] determined that early mobilization reduced adverse events; however, many early mobilization protocols remain non-standardized. In the systematic review by de Queiroz et al. [8], mobilization interventions were incompletely described in the randomized controlled trials and could compromise clinical and research replication. The remaining three articles [4,10,11] were unified in the fact that early mobilization in postoperative cardiac surgery patients improved patient outcomes by decreasing postoperative complications, improving functional capacity, decreasing the length of hospital stay, and decreased hospital readmission.

Cui et al. [12], Højskov et al. [13], Moradian et al. [14] and Zanini et al. [2] conducted randomized controlled trials evaluating early ambulation with active upper and lower limb exercises, early rehabilitation or usual care, Six-Minute Walk Test, and varying psychological components. Their studies indicated that patients had a reduction in postoperative complications with an early ambulation program, improved recovery and increased functional capacity, reduced patient length of stay, and improved physiological and psychological rehabilitation of the elderly patients studied. In addition, Højskov et al. [13] indicated that mental health and physical activity had a beneficial effect on decreasing depressive symptoms postoperatively. Furthermore, Moradian et al. [14] determined that their intervention group had a lower incidence of atelectasis, pleural effusions, and decreased hospital length of stay. Additionally, a quasi-experimental study conducted by Yayla et al. [15] indicated that early postoperative mobilization in the cardiac surgery patient reduced postoperative complications, reduced hospital length of stay, and improved sleep scores. Of the thirteen articles reviewed, three articles [6,8,16] were qualitative analyses and evaluated the effects of early exercise in the postoperative cardiac surgery patient and the Intensive Care Unit (ICU). Two studies concluded that early mobilization in postoperative cardiac surgery patients and patients in the ICU improves patient outcomes [8,16]. Conversely, the study by Itagaki et al. [6] demonstrated a 17% physical functional decline in patients after cardiac surgery. Furthermore, they noted that additional research would need to be conducted to include rehabilitation before and after cardiac surgery to overcome the decline in physical functioning [6].

Overall, the literature is cohesive in that effective interventions aimed at early mobilization of postoperative cardiac surgery patients are essential. In addition, improving understanding and increasing awareness of the postoperative complications, decreased functional capacity, and increased hospital length of stay related to delayed mobilization in the postoperative surgical patient is critical. However, it is essential to note that early mobilization protocols must be standardized and thoroughly described not to compromise clinical and research replication.

## **Conceptual and Theoretical Framework**

Structuring the practice change through implementing a process improvement framework is instrumental to the success of the change. The Iowa Model of evidence-based practice to improve quality of care is a seven-step process involving a team approach for organizational change [17]. This framework is widely used to implement evidence-based practice [17]. For this project, the Iowa Model of Evidence-Base Practice [18,19] was utilized to organize each phase of the project and assisted in keeping implementation on task. In addition, it helped characterize the implemented changes via small areas of evaluation.

## **Methodology**

The setting for this project was an urban academic destination medical center (hospital) in Northeast Florida. Specifically, the surgical intensive care unit (SICU) was the target location within the institution. This unit serves a high volume of patients with varying types of cardiac surgery. The SICU was ideal because the patient was directly admitted to the SICU from the operating room after cardiac surgery.

The statement of agreement with the site utilized was obtained. Agency-specific IRB approval was sought and determined to be exempt. Quality Improvement Registry was not required on the part of the agency site prior to the initiation of the project. The project involved human subjects; however, the project did not require private health information (PHI) from patient charts thus IRB was not required.

Participants in this study implemented the early mobility protocol; participants included the nursing staff and other allied health staff caring for the postoperative cardiac surgery patient (i.e., patient care assistants, physical therapists) within the surgical ICU. A discussion with the SICU nurse manager regarding the early mobility protocol garnered her support, and participation in the early mobility protocol was mandatory for the SICU staff.

Two sources of data were collected. The pre-implementation data source was obtained via spot checks for mobility times at the time of provider rounds. In addition, the author and the Critical Care Service (CCS) Advanced Practice Providers (APPs) collected the pre-implementation data. The author conducted a chart review to document the patient's extubation time. The post-implementation data source was an auditing tool completed by the nursing staff. Extracted data included baseline adherence rates with specific aspects of early mobility in postoperative cardiac surgery patients.

## **Intervention and Data Collection Procedures**

Small, targeted educational sessions were given to registered nurses in the SICU at an academic center in Northern Florida. These sessions detailed how to improve early mobility in the SICU, the importance of implementation, and how to implement it appropriately. These educational sessions were in-person short lectures during the change of shift huddle and reinforced by emails and flyers. They occurred over three weeks to target 75% of the nursing staff. This author primarily implemented these educational sessions. The advanced practice providers on the CCS served as edifying champions in the subsequent implementation of the intervention.

In addition to nurse education, the patients received education regarding the early mobility protocol during their preoperative teaching. Most scheduled cardiac surgeries are elective cases. Preoperative open-heart surgery teaching was completed in the clinic by the clinic nurse for the Department of Cardiothoracic Surgery. For those patients that were inpatients before their surgery, the patient's nurse and a Cardiothoracic APP completed the preoperative teaching. Educational handouts detailing the early mobility protocol were given to the patient during their preoperative teaching (both inpatient and outpatient) to review. In addition to the handouts, the early mobility protocol was discussed with the patients and their family members. The patients were provided with evidence-based research about the benefits of early mobilization after cardiac surgery. Early mobilization after cardiac surgery is essential in preventing postoperative complications, improving functional capacity, and reducing hospital stay length [4].

## **Data Collection Procedures**

Pre- and post-implementation data collection occurred over two weeks. The collected data is elucidated in the auditing survey. The information collected was stored in a locked file cabinet. Once all pre-and post-implementation data was finalized, it was transcribed into a password-protected database for analysis and review. Finally, the data was reported as aggregate data.

## **Tools Used**

The primary variable that was measured was adherence. Adherence was measured through perceived evaluation in the format of a binary audit conducted primarily by this author and the Critical Care APPs. Each postoperative cardiac surgery patient had the binary auditing tool present at the bedside for each nurse to collect data on for the patient. There was a degree of concern that the bedside nurse would not complete the data collection form, which would impact the project results. Due to this concern, this author and the CCS APPs continued with “spot checks” during provider rounds on the auditing tool and patient mobility. The “spot checks” helped increase the reliability and validity of the binary audit tool.

## **Implementation Plan**

Pre-implementation involved educating managerial staff, nursing staff, and patient care technicians regarding the project. This education took place over several weeks in September 2021. The education for the staff included background information about the importance of early mobility in postoperative cardiac surgery patients. In addition to the background information, everyone received a copy of the auditing tool to review. A flyer was created with the background information, early mobility goals in cardiac surgery patients, and the auditing tool and was posted in areas in the unit where there was high staff traffic. Additionally, the information was sent out to the staff in email form. The baseline data was gathered using the activity guide for the project over two weeks in August 2021.

Implementation of the project started in September of 2021 and ended in November of 2021. The staff completed the auditing tool from September 13, 2021, through November 15, 2021. Therefore, the auditing tool remained with the patient for the duration of their SICU stay. The auditing tool was collected in a central location by the authors.

Post-project data collection and analysis, including formulation of an evaluation synthesis, occurred over two weeks altogether. The data was presented to the SICU via poster presentation during multiple staff meetings.

## **Analysis Plan**

The primary data endpoint evaluated adherence with improving early mobility in postoperative cardiac surgery patients. Compliance with the protocol was evaluated via “spot checks” during provider rounds and randomly throughout the day and night shift.

The significance of the results was calculated and evaluated with descriptive statistics. Significant areas of interest were the number of patients ambulating early before and after the intervention. The results were given in percentages. The pre-and post-intervention significant descriptive statistics are shown in Table Two.

## **Results**

As previously mentioned, Descriptive Statistics was utilized to compare the pre-and post-implementation data. In total, 40 audits were performed. Statistical significance was observed in the post-implementation audited areas, indicating improved overall adherence. Compared to the baseline 0% (n=14), compliance with being out of bed within six hours of extubation improved to 92.31% (n=24); compliance with up in the chair twice on postoperative day one decreased from 100% to 96.15% (n=25); compliance with ambulating two times in the hall on postoperative day one, increased from 50% to 92.31% (n=24); compliance with up in the chair twice on postoperative day two, decreased from 100% to 96.15% (n=25); compliance with ambulating three times in the hall on postoperative day two, increased from 69.23% to 80.77% (n=21); compliance with up in the chair three times on postoperative day three, decreased from 100% to 96.15% (n=25); compliance with ambulating three times in the hall on postoperative day three, increased from 57.14% to 80.77% (n=21). Overall, mobility improved with the implementation of the project. Table Three.

## **Discussion**

It is widely known that lack of early mobility in the postoperative cardiac surgery patient increases postoperative complications such as prolonged ventilation, uncontrolled pain, pleural effusions, wound infection, and prolonged hospitalization [2,4]. Subsequently, implementing early mobility interventions such as getting the patient out of bed within six hours of extubation and early ambulation can improve overall outcomes, decrease ICU length of stay, decrease hospital length of stay and improve one’s quality of life. Often, these interventions are implemented via multidisciplinary teams involved in the patient’s care. Therefore, the present study investigated whether targeted educational interventions improved adherence to a new early mobility protocol in postoperative cardiac surgery patients.

This study demonstrated a positive correlation between providing education and in-servicing and improving adherence to an early mobility protocol in postoperative cardiac surgery patients. Results of this study build on the existing evidence suggesting that early mobility protocols in targeting specific mobility-related goals in the SICU are similar to the results of studies conducted by Cordeiro et al. [1], Santos et al. [4], and Zanini et al. [2]. By controlling external factors, postoperative cardiac surgery patients’ mobility can significantly improve.

Further research is needed to establish whether adherence to the current early mobility protocol in postoperative cardiac surgery patients decreases, SICU length of stay, postoperative complications, and hospital length of stay. In addition, further research should evaluate patients' perception of improved overall quality of life, and durability of the intervention. Continued adherence to the early mobility protocol will lead to further data on multiple components to evaluate overall outcomes and costs to the institution and the patient.

## Conclusion

Adherence with the early mobility protocol in postoperative cardiac surgery patients remains a challenge. The results of this project supported the hypothesis that provider education through the in-servicing of staff can improve adherence with an early mobility protocol in postoperative cardiac surgery patients. Additionally, with the implementation of the early mobility protocol, further studies should be conducted to evaluate postoperative outcomes and length of stay.

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