Aloha International Journal of Health Advancement (AIJHA)
ISSN 2621-8224
Volume 4 Number 3, March 2021 RESEARCH
http://journal.aloha.academy/index.php/aijha DOI: http://dx.doi.org/10.33846/aijha40303

The Relationship Between the Implementation of Phase I Cardiac Rehabilitation and the Outcome of Patients Undergoing Coronary Artery Bypass Surgery in West Java Hospitals

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Submitted: February 2, 2021 -Revised: March 2, 2021 -Accepted: March 22, 2021 -Published: March 31, 2021

ABSTRACT

The implementation of phase I cardiac rehabilitation in patients undergoing Coronary Artery Bypass Surgery is useful to assist the recovery process and improve the quality of patient outcomes. However, the implementation of cardiac rehabilitation in Coronary Artery Bypass Surgery patients is still unknown. Thus, this study aims to identify how the implementation of phase I cardiac rehabilitation and its relationship to the outcome of patients undergoing coronary artery bypass surgery in hospitals in West Java. The research design was a cohort study. Sampling was done by purposive sampling method and obtained 24 respondents. Data were collected by observing the implementation of phase I cardiac rehabilitation and patient outcome sheets. The data were analyzed descriptively, followed by the Kendall Tau and Spearman Rank tests. The results showed that the implementation of phase I cardiac rehabilitation was in the sufficient and less categories (50%), the length of stay in the intensive room was prolonged (70.8%), postoperative length of stay was in the normal category (95.8%), there were postoperative complications (20.8%), functional capacity in the category of light intensity activity (83.3%), and knowledge in the good category (66.7%). The results of the analysis of the relationship between the implementation of phase I cardiac rehabilitation with patient outcomes (length of stay in the intensive care unit and postoperatively, postoperative complications, functional capacity, and knowledge) showed p value > 0.05. Furthermore, it was concluded that there was no relationship between the implementation of phase I cardiac rehabilitation and patient outcomes. However, clinically it does not mean that phase I cardiac rehabilitation has no impact on patient outcomes. This may occur because the implementation of cardiac rehabilitation is still in the sufficient and insufficient category, as a result of the lack of clarity of the SOPs used. So it is recommended to evaluate and improve SOPs on cardiac rehabilitation so that it is in harmony with patients undergoing Coronary Artery Bypass Surgery.
Keywords: Coronary artery bypass surgery; patient outcome; phase I cardiac rehabilitation

INTRODUCTION

Coronary Artery Bypass Surgery is a major surgical operation with a long enough duration, so the patient requires an optimal recovery process to return to normal function. In addition, patients undergoing Coronary Artery Bypass Surgery are at risk for more severe postoperative complications that can affect patient outcomes including increased length of stay and postoperative mortality [(1)]. One of the efforts to improve the quality of patient outcomes is to intervene in the form of cardiac rehabilitation. Cardiac rehabilitation is an action taken by several health workers whose actions consist of exercise/physical activity, education about risk factors for heart disease, counseling on nutrition and psychology, and management of stress and anxiety [(2)]. The purpose of cardiac rehabilitation is to improve the quality of life, improve physical, mental and social function, and prevent complications after heart surgery [(3)].

Cardiac rehabilitation is divided into three phases, namely phase I (when the patient is hospitalized, phase II (out of hospital for up to 12 weeks), and phase III (after completing the phase II program). All patients go through in stages. Phase I cardiac rehabilitation is a very important stage to do because this stage helps the patient's success in undergoing the transition phase of normal physical, psychological and life status of the patient.

Various studies have shown that Coronary Artery Bypass Surgery patients undergoing phase I cardiac rehabilitation have various advantages, including shortening intubation time, reducing the occurrence of postoperative complications including pleural effusion, atelectasis, pneumonia, and atrial fibrillation/flutter, shortening length of stay, increasing functional capacity, and reducing anxiety in patients undergoing Coronary Artery Bypass Surgery [(5-7)].

Based on the results of observations and interviews at a hospital in West Java, phase I cardiac rehabilitation has been carried out on heart patients, especially those who will undergo Coronary Artery Bypass Surgery.

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However, there has never been an evaluation related to the implementation of phase I cardiac rehabilitation in patients undergoing Coronary Artery Bypass Surgery.

The purpose of this study was to examine the relationship between the implementation of phase I cardiac rehabilitation and the outcomes of patients undergoing BPAK surgery in hospitals in West Java.

METHODS

The research design was a cohort study. Sampling was done by purposive sampling method for 4 months. The inclusion criteria in this study were patients who were going to undergo Coronary Artery Bypass Surgery, aged >18 years, and did not experience walking disorders; while the exclusion criteria were patients who died during the study. This research was conducted at the West Java Hospital and has been approved by the Health Research Ethics Commission of the Faculty of Medicine, Universitas Padjadjaran with the number 562/UN6.KEP/EC/2019 and the Health Ethics Commission of Dr. RSUP. Hasan Sadikin Bandung with the number LB/02.01/X.6.5/69/2019.

Data retrieval using an observation sheet instrument for the implementation of phase I cardiac rehabilitation (modification of Standard Operating Procedures / SOP for Hospital Cardiac Rehabilitation and Wenger Protocol for Cardiac Rehabilitation) in the form of a checklist starting from preoperative and continued postoperatively until the patient will go home. In addition, the patient outcomes included length of stay in the intensive care unit, length of postoperative stay, and postoperative complications based on the patient's medical record; functional capacity was measured by a 6-minute walking test, and knowledge level was measured by asking respondents to fill out a knowledge questionnaire.

Descriptive data analysis was conducted to describe the characteristics of the respondents, the implementation of phase I cardiac rehabilitation, and patient outcomes, which were presented in tabular form. The Kendal Tau test was conducted to analyze the relationship between the implementation of phase I cardiac rehabilitation with length of stay in the intensive care unit, length of stay after surgery, postoperative complications; Meanwhile, to analyze the relationship between the implementation of phase I cardiac rehabilitation with functional capacity and patient knowledge, the Spearman Rank test was used.

RESULTS

Most of the respondents were male (83.3%) and aged >60 years (41.7%), with secondary education. Most of the respondents had a body mass index in the normal category and only 2 respondents had comorbidities (table 1). For the implementation of Phase I Cardiac Rehabilitation, all respondents were in the sufficient and less categories, each of which was 50% (Table 2).

Table 1. Distribution of respondents characteristics

Characteristics	Frequency	Percentage
Age (years)		
- 40-49	5	20.8
- 50-59	9	37.5
- 60-69	10	41.7
Gender		
- Male	20	83.3
- Female	4	16.7
Education		
- Basic (elementary and secondary school)	2	8.3
- Intermediate (high school)	15	62.5
- High (college)	7	29.2
Body mass index		
- Underweight (<17 kg/m^2)	0	0
- Normal (18-25 kg/m^2)	12	50
- Overweight (25-27 kg/m^2)	7	29.2
- Obese (>27 kg/m^2)	5	20.8
Co-morbidities*		
- Yes	2	8.3
- No	22	91.7

Note: *Other diseases experienced by the patient other than coronary artery disease and risk factors for coronary artery disease include acute kidney injury, hospital acquired pneumonia, and bleeding.

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Table 2. Distribution of phase I heart rehabilitation

Category	Frequency	Percentage
Good	0	0
Enough	12	50
Less	12	50
Very less	0	0

For the outcome of length of stay in the intensive care unit, most of them were in the prolonged category (70.8) and postoperative length of stay in the normal category (95.8%). Most of the respondents did not experience postoperative complications (79.2%), while the complications that occurred in 5 respondents included Acute Kidney Injury, Hospital Acquired Pneumonia, and bleeding. For functional capacity, most of the respondents were in the category of light intensity activity (83.3%); while for the level of knowledge, most of the respondents were in the good category (66.7%) (Table 3).

Table 3. Distribution of the patient outcomes

Characteristics	Frequency	Percentage
Length of stay in the intensive care unit		
- Normal	7	29.2
- Prolonged	17	70.8
Postoperative length of stay		
- Normal	23	95.8
- Prolonged	1	4.2
Complication		
- Yes	5	20.8
- No	19	79.1
Functional capacity		
- Light-intesity activitiy	20	83.3
- Moderate-intensity activity	4	16.7
Knowledge		
- Good	16	66.6
- Moderate	7	29.2
- Less	1	4.1

Table 4. The results of the analysis of the relationship between the implementation of phase I cardiac rehabilitation with patient outcomes

Variables	Implementation of phase I cardiac rehabilitation	
	Correlation coefficient	p-value
Length of stay in the intensive care unit	-0.092	0.660
Postoperative length of stay	-0.209	0.317
Complication	0.308	0.140
Functional capacity	<0.001	1.000
Knowledge	-0.365	0.079

Based on the analysis, it showed $p>0.05$, so there was no relationship between the implementation of phase I cardiac rehabilitation and patient outcomes, both Length of stay in the intensive care unit, postoperative length of stay, complication, functional capacity and knowledge.

DISCUSSION

Implementation of Phase I Cardiac Rehabilitation

In this study, the entire implementation of phase I cardiac rehabilitation in patients undergoing Coronary Artery Bypass Surgery was only in the sufficient and less categories, respectively, as many as 12 respondents (50%). One of the factors that caused this was because as many as 33.3% of respondents did not receive preoperative phase 1 cardiac rehabilitation interventions in the form of exercises such as effective coughing, diaphragmatic/abdominal breathing, joint range of motion, ankle pumping and transfer exercises, and almost all respondents not given education related to the causes and triggers of myocardial infarction (91.7%), regular drug use (100%), or sexual activity after Coronary Artery Bypass Surgery surgery (91.7%).

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Patients who do not participate in the preoperative phase I cardiac rehabilitation program are at risk of having an unfavorable outcome. According to Snowdon, Haines, & Skinner and Zhang et al. [7,8], providing education, physical exercise, breathing exercises and psychological counseling on 2-3 days before surgery can improve patient outcomes including reducing anxiety, reducing the occurrence of postoperative complications, shorten intubation time which will affect the decrease in patient length of stay.

After passing the preoperative phase, the patient will receive a postoperative cardiac rehabilitation intervention which will begin on POD 1 (post operative day) or when the patient has been extubated. All respondents (100%) were taught effective coughing and abdominal breathing when the patient was extubated and most of the respondents underwent physical exercise and early mobilization. Physical exercises that are carried out include joint motion exercises in the upper extremities, shoulders, and neck, as well as ankle pumping which is done actively, but for the range of motion of the joints in the lower extremities it is done passively.

In addition to joint movement exercises, more than 80% of respondents were carried out gradual mobility (transfer) such as exercises sitting beside the bed, and sitting upright in a chair (sitting in bed without a backrest), while for standing and walking exercises only about 50% of respondents did. According to the results of the study by Moradian, et al. [9], postoperative patients who had just been mobilized from the bed on the third day (when the chest tube had been removed) had lower oxygen tension and oxygen saturation compared to patients who were immediately discharged. Early mobilization was carried out in the form of gradual exercises from sitting beside the bed (2 hours after extubation) and then walking straight away in the afternoon.

Based on observations, almost all respondents were given education about exercises that must be done after returning home, such as walking exercises on a flat area and conducting a phase I 1 cardiac rehabilitation program, but were never given education related to sexual activity either during postoperative cardiac rehabilitation or before patient goes home. In fact, providing education related to sexual activity is important in helping patients who experience sexual problems because most patients will experience a decrease in sexual activity 12 weeks after heart surgery. [10]

Patient Outcome

Most of the respondents had an outcome of postoperative length of stay in the normal category, while the length of stay in the intensive care unit was in the extended category. This is due to age, complications that occur after surgery, and conditions that occur in the hospital such as the unavailability of beds in the intermediate room. According to Almashrafi, Elmontsri, & Aylin [1], postoperative complications are one of the factors that affect the length of stay. The next outcome that is seen is complications that occur after surgery. A total of 5 respondents (20.8%) experienced postoperative complications including bleeding, Acute Kidney Injury and Hospital Acquired Pneumonia. This finding is consistent with previous studies which stated that complications that could occur after Coronary Artery Bypass Surgery include bleeding, infection, heart attack, and disorders of the respiratory system [11,12].

Outcomes of functional capacity were carried out with a 6-minute walking test. The results showed that most of the respondents showed metabolic equivalents (METs) of mild intensity (83.3%). The results of the METs were obtained from the distance traveled by the respondent when a 6-minute walk test was carried out where the furthest distance traveled by the respondent was 252 meters. In line with the results of research conducted by Harikatang, Rampengan, & Jim, [13] as many as 54.8% of the total respondents were only able to cover a distance of less than 300 meters when the 6-minute walking test was performed.

In the assessment of the level of knowledge, it was found that most of the respondents had a good level of knowledge (66.7%). However, if you look at the questionnaire, most of the respondents answered incorrectly on the statements regarding risk factors, diet in patients with coronary artery disease, breathing using the abdomen, and postoperative activities. This happened because there was no education regarding the causes, risk factors and triggers of coronary artery disease, lifestyle modification, preoperative risk factors, and only a small proportion of respondents were given postoperative education. According to Elsayed, et al. [14] education related to lifestyle modification, diet, use of drugs, sexual activity and work activities can increase the knowledge of postoperative patients which will result in increased postoperative patient self-efficacy.

The Relationship between the Implementation of Phase I Cardiac Rehabilitation and the Outcome of Patients Undergoing Coronary Artery Bypass Surgery

In this study, there was no significant relationship between the implementation of phase I cardiac rehabilitation and all patient outcomes, both length of stay. This study is different from previous research conducted by Herdy [5] which stated that the provision of phase I cardiac rehabilitation affected the length of stay, both the length of

stay in the intensive room and the length of postoperative hospitalization, postoperative complications, and functional capacity with walking tests. minute.

There was no significant relationship in this study, possibly due to the limitation of length of stay from health insurance which had an impact on the implementation of phase I cardiac rehabilitation and patient outcomes. Although cardiac rehabilitation interventions have not been carried out at all stages, patients are still allowed to go home if their condition is stable and without postoperative complications.

Another possibility is that there is no relationship between the implementation of phase I cardiac rehabilitation and postoperative complications because most of the respondents performed effective cough-breathing exercises after extubation and also performed bundle VAP (ventilation-associated pneumonia) care while still intubated even though cardiac rehabilitation was only carried out. in the sufficient and less categories. From the results of the study there were only 5 respondents who experienced postoperative complications.

Another outcome that was not associated with the implementation of phase I cardiac rehabilitation was functional capacity with a 6-minute walk test. Most of the respondents (85.7%) were in the light intensity activity category. So it can be seen that the low value of the implementation of phase I 1 cardiac rehabilitation also indicates a mild value of functional capacity. In accordance with research conducted by Savci et al. [(15)] stated that the provision of phase I cardiac rehabilitation interventions in the form of active extremity exercises, mobilization, and chest physiotherapy in pre and postoperative periods can increase lung functional capacity and respiratory muscle strength.

There is no relationship between the implementation of phase 1 cardiac rehabilitation and knowledge because most of the respondents did not receive education regarding the causes and triggers of coronary artery disease, regular drug use, sexual activity, lifestyle changes and risk factor modification, although the results of the knowledge level questionnaire showed similar results. good. This happens because most of the respondents have a fairly good level of education (high school and higher education) and already have knowledge from the information they obtained before the Coronary Artery Bypass Surgery, not from the educational process in the phase I cardiac rehabilitation program. This is in accordance with Notoadmodjo's theory (2010) that a person's knowledge can be influenced by the level of education and sources of information. The higher a person's education, the easier it will be to receive information, either obtained from other people or by seeking information on their own from other sources.

CONCLUSION

Based on the results of the study, it was found that the entire implementation of Phase I Cardiac Rehabilitation was in the sufficient and less categories. While the length of stay in the intensive care unit was mostly in the extended category and postoperative length of stay was in the normal category, there were several postoperative complications, the functional capacity was in the light-intensity activity category and of the respondents was in the good category of knowlwdge. It is also known that there is no significant relationship between the implementation of Phase I Cardiac Rehabilitation with patient outcomes.

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