Evidence-Based Case Report

Return to Work in Post-Revascularization Patients with Acute Coronary Syndrome Undergoing Phase II Cardiac Rehabilitation

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Abstract

Returning to work is an essential indicator of functional and psychosocial recovery in post-revascularization patients with acute coronary syndrome (ACS). Participation in Phase II cardiac rehabilitation (CR) is believed to facilitate this process through structured exercise, education, and psychological support. This study aimed to evaluate the effect of Phase II CR on return-to-work outcomes among post-revascularization ACS patients. An evidence-based case report was conducted through a systematic search of PubMed, Scopus, ProQuest, ScienceDirect, and SpringerLink databases from 2013 to 2023. Eligible studies included randomized controlled trials, cohort studies, and systematic reviews that assessed return-to-work outcomes in patients undergoing coronary artery bypass grafting or percutaneous coronary intervention who participated in Phase II CR. Articles not available in full text, published before 2013, or unrelated to return-to-work outcomes were excluded. Three studies met the inclusion criteria: two systematic reviews and one prospective cohort study encompassing approximately 68,000 patients. All reported that CR participation improved physical function, quality of life, and the likelihood of returning to work. The average time to return ranged from 9 to 32 weeks, with higher rates among younger males with white-collar occupations and preserved ejection fraction. Phase II CR significantly enhances recovery and expedites return to work, underscoring its essential role in post-ACS care.
Keywords*: return to work, acute coronary syndrome, cardiac rehabilitation, coronary artery bypass.*

Kembali Bekerja pada Pasien Pascarevaskularisasi dengan Sindrom Koroner Akut yang Menjalani Rehabilitasi Jantung Fase II

Abstrak

Kembali bekerja merupakan indikator penting dari pemulihan fungsional dan psikososial pada pasien pascarevaskularisasi dengan sindrom koroner akut (SKA). Partisipasi dalam rehabilitasi jantung fase II diyakini dapat mempercepat proses tersebut melalui program latihan terstruktur, edukasi, serta dukungan psikologis. Penelitian ini bertujuan untuk mengevaluasi pengaruh rehabilitasi jantung fase II terhadap luaran kembali bekerja pada pasien pascarevaskularisasi dengan SKA. Laporan kasus berbasis bukti ini dilakukan melalui penelusuran sistematis pada basis data PubMed, Scopus, ProQuest, ScienceDirect, dan SpringerLink dalam rentang waktu 2013 hingga 2023. Kriteria inklusi mencakup uji acak terkontrol, studi kohort, dan tinjauan sistematis yang menilai luaran kembali bekerja pada pasien pasca operasi pintas arteri koroner atau intervensi koroner perkutan yang mengikuti rehabilitasi jantung fase II. Artikel yang tidak tersedia dalam bentuk teks lengkap, terbit sebelum tahun 2013, atau tidak relevan dengan topik penelitian dikecualikan. Tiga studi memenuhi kriteria inklusi, terdiri atas dua tinjauan sistematis dan satu studi prospektif yang melibatkan sekitar 68.000 pasien. Seluruh studi menunjukkan bahwa rehabilitasi jantung meningkatkan fungsi fisik, kualitas hidup, dan peluang kembali bekerja. Rata-rata waktu kembali bekerja berkisar antara 9 hingga 32 minggu, dengan tingkat keberhasilan lebih tinggi pada pasien laki-laki usia muda dengan pekerjaan nonfisik dan fraksi ejeksi yang baik. Rehabilitasi jantung fase II berperan penting dalam mempercepat pemulihan serta meningkatkan peluang kembali bekerja, sehingga perlu diintegrasikan dalam perawatan pasca SKA.
Kata kunci : *kembali bekerja, sindrom koroner akut, rehabilitasi jantung, bypass arteri koroner.*

Introduction

The Global Burden of Disease (GBD) 2019 study identified Indonesia as the country with the sixth highest number of cardiovascular disease (CVD) deaths globally, with an estimated 375,479 deaths recorded in that year.[1] In addition, the 2016 Sample Registration System survey found that acute coronary syndrome (ACS) was the second leading cause of death across all age groups in Indonesia, following stroke, accounting for 13% of total mortality.[2] Due to the substantial health burden posed by ACS, percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG) are frequently utilized treatment strategies, both of which are safe and effective.[3] At Cipto Mangunkusumo Hospital in Jakarta, Indonesia, 55 patients underwent CABG in the year 2022 alone. The age distribution of these patients was as follows: 16% were ≤50 years old, 24% were aged 51–55 years, 22% were aged 56–60 years, 18% were aged 61–65 years, 15% were aged 66–70 years, and 5% were aged> 70 years. A study by Maznyczka *et al*.[4] found that 93% of post-PCI patients and 77% of post-CABG patients returned to work, with median return-to-work times of 6 weeks for PCI and 13 weeks for CABG, and 75% of patients employed prior to revascularization.

Returning to work is a key indicator of successful recovery following cardiac events and plays a vital role in restoring a patient's quality of life, independence, and social identity.[5] It not only reduces the risk of long-term disability but also alleviates the economic burden on individuals and health systems. Multiple studies have shown that younger age, male sex, higher education level, and employment in white-collar jobs are associated with a greater likelihood of returning to work.[4,6,7] Conversely, delayed return is linked to female sex, history of depression, low socioeconomic status, and physically demanding occupations.[4,8] Participation in cardiac rehabilitation (CR) programs has also been shown to improve functional capacity, psychological well-being, and ultimately increase return-to-work rates.[4,7,9] Addressing both medical and psychosocial barriers through structured rehabilitation can significantly support reintegration into the workforce after events such as PCI or CABG.

CR aims to restore physical, psychological, and social functioning following cardiovascular events. CR is typically delivered in three phases. Phase I begins in the inpatient setting immediately after an event, focusing on early mobilization and patient education.[10] Phase II, the structured outpatient phase, plays a pivotal role in recovery and return to daily life but remains highly underutilized globally, with availability reported in only about 40% of countries and as low as 22.1% in low and middle-income nations.[11,12] This phase usually lasts 3-12 weeks and includes supervised exercise, education, and lifestyle interventions. Phase III supports long-term health maintenance and independence.[10] Key factors influencing return to work after cardiac events include myocardial damage, physical function, mental health, age, employment type, and access to rehabilitation programs.[13] Increasing participation in Phase II CR is essential for enhancing patient outcomes, especially in terms of improving return-to-work rates among those recovering from PCI and CABG. Therefore, this evidence-based case report aims to evaluate the impact of Phase II cardiac rehabilitation on return-to-work outcomes among patients with acute coronary syndrome who have undergone revascularization procedures, particularly CABG.

Clinical Scenario

A 55-year-old male presented to Cipto Mangunkusumo Hospital for CABG. The patient is employed as a civil servant with predominantly sedentary work. The patient had experienced exertional dyspnea since 2021, along with chest discomfort radiating to the back and orthopnea. He denied associated symptoms such as cold sweats or palpitations. His medical history was notable for hypertension for the past 20 years, for which he had been on regular antihypertensive therapy. The patient was admitted on March 15, 2022, then underwent CABG at the same hospital on March 16, 2022, followed by a nine-day

postoperative hospitalization during which he participated in Phase I cardiac rehabilitation.

Following discharge, he was enrolled in phase II CR at the hospital's Physical Medicine and Rehabilitation Unit. On physical examination conducted on April 19, 2022, the patient was alert and hemodynamically stable, with a blood pressure of 140/90 mmHg, pulse rate of 82 bpm, respiratory rate of 20 breaths per minute, and body temperature of 36.5°C. Jugular venous pressure was not elevated, and thoracic examination was unremarkable.

Electrocardiography on the same day (ECG) revealed sinus bradycardia with first-degree atrioventricular block, a PR interval of 0.12 seconds, QRS duration of 0.08 seconds, T-wave inversion in lead V3, and evidence of left ventricular hypertrophy. A chest radiograph showed aortic elongation and calcification without cardiopulmonary abnormalities. Transthoracic echocardiography demonstrated concentric left ventricular hypertrophy with normal global wall motion, intact valvular structures, preserved systolic function, with 62.8% of ejection fraction (EF), and grade I diastolic dysfunction. Coronary angiography revealed a normal left main coronary artery, subtotal stenosis in the left anterior descending artery post-septal branch, chronic total occlusion (CTO) in the proximal left circumflex artery with distal retrograde filling, and CTO in the proximal right coronary artery with similar collateral perfusion.

The patient underwent a structured 6-minute walk test (6MWT) during both Phase I and Phase II of cardiac rehabilitation, as detailed in Table 1. A treadmill exercise test was performed after the completion of phase II cardiac rehabilitation, with the following results: the heart rate response was appropriate, the blood pressure response was appropriate, there were no arrhythmias, no chest pain, no other symptoms, a metabolic equivalent (METs) of 7.6, and a negative ischemic response. The patient voluntarily resumed work 39 days after CABG on April 25, 2022, indicating a strong motivation to reintegrate into his occupational routine.

Problem Formulation

P (Population): Patients with post-CABG ACS
I (Intervention): Participation in Phase II CR
C (Comperator): Patients who do not participate in Phase II CR
O (External): Return to work, including rate (proportion returning) or timing (time to return)

Research question: "In patients with ACS who have undergone CABG, how does participation in Phase II CR, compared to non-participation, affect measurable return to work outcomes, including the rate of return and time taken to return to work?"

Table 1. Results of the Patient's 6MWT

		Phase 1	Beginning of Phase II	Middle of Phase II	End of Phase II
Pre-walk test	Blood pressure (mmHg)	140/80	141/92	121/70	135/90
	Heart rate (times/minute)	58	88	71	56
	SpO2(%)	99	97	97	98
	Borg scale	8 – 0 – 0	7 – 0 – 0	9 – 2 – 2	8 – 1 – 0
Post-walk test	Blood pressure (mmHg)	136/79	142/94	149/84	121/70
	Heart rate (times/minute)	74	91	72	71
	SpO2(%)	98	99	99	97
	Borg scale	12 – 3 – 0	12 – 3 – 0	11 – 2 – 3	9 – 2 – 0
Distance (meters)		123	315	487	590
VO2max (ml/kg/minute)		7.8	13.42	18.59	21.68
METs		2.25	3.83	5.31	6.1

Search Strategy and Results

A comprehensive literature search was conducted to address the clinical question using the electronic databases PubMed, Scopus, ProQuest, ScienceDirect, and SpringerLink. To optimize the search results, a combination of Medical Subject Headings (MeSH) terms, text keywords, and Boolean operators ("AND", "OR", "NOT") was applied. The target population was patients with ACS who had undergone CABG. Search terms included: "coronary artery bypass graft", "acute coronary syndrome", "revascularization", and "myocardial infarction", along with relevant synonyms and associated terms. A primary search of studies was carried out in June 2023. The following restrictions were applied: publication date from January 1, 2013, to June 1, 2023, and human studies only, to ensure inclusion of recent, relevant evidence.

This present study focused on intervention-based studies, prioritizing systematic reviews (with or without meta-analysis) to ensure the highest level of evidence. In the absence of systematic reviews, the search was extended to include randomized controlled trials (RCTs) and prospective cohort studies. Retrieved articles were screened by title and abstract to identify relevant studies and exclude irrelevant or duplicate entries. A full-text review was conducted according to pre-established eligibility criteria, and selected studies were appraised using the Oxford Centre for Evidence-Based Medicine Levels of Evidence worksheet.

The inclusion criteria consisted of full-text articles in English or Indonesian evaluating return-to-work outcomes in post-CABG patients participating in Phase II CR, including RCTs, prospective studies, clinical interventions, and systematic reviews. Exclusion criteria included studies older than 10 years, articles not focused on return to work, articles with inaccessible full texts, articles without study results, publications in other languages, and RCTs already incorporated into the most recent systematic reviews. The article selection process is illustrated in a PRISMA flow diagram (Figure 1).

A total of 3 studies were included in the review; 2 were systematic reviews, and 1 was a prospective study. All studies reviewed consistently demonstrate that CR has a positive impact on patients after CABG, improving physical function, quality of life, and return-to-work outcomes, as summarized in Table 2. Each eligible article underwent a critical appraisal using the Oxford Centre for Evidence-based Medicine Levels of Evidence validation criteria to evaluate its validity, relevance, and applicability to the clinical context, with the results presented in Tables 3 and 4.

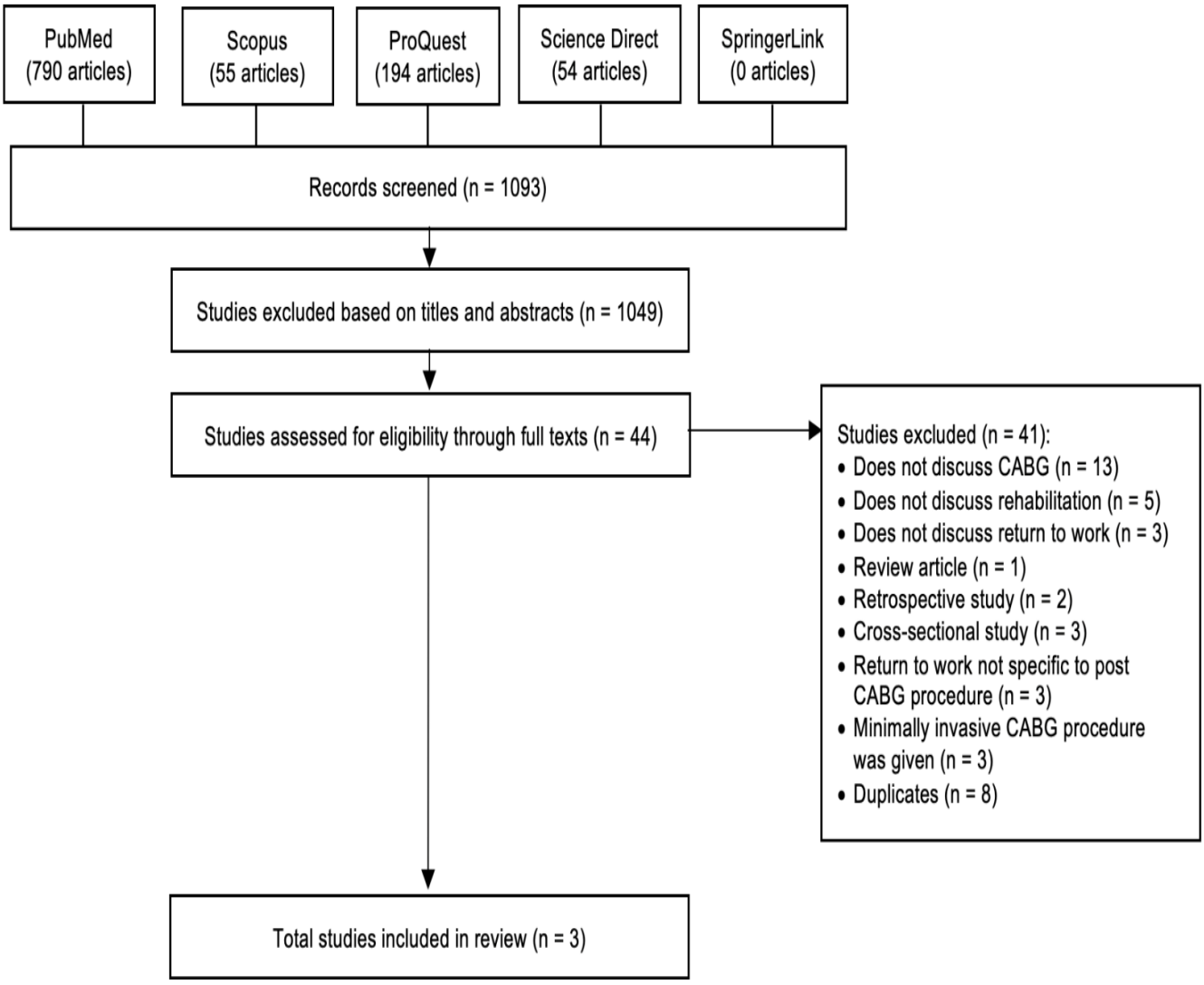

Figure 1. PRISMA Flowchart of Literature Searches

Table 2. Summary of Included Studies

Author (Year)	Study Type	Population	Study Samples	Intervention	Outcome	Intervention Period or Follow Up
Blokzijl et al.[13] (2018)	Systematic review meta-analysis	• Patients with post-CABG, post-type A aortic dissection, post-valve surgery, or combined procedures • Total patients: 3,654	• 33 studies: 18 RCTs and 15 observational studies, but only 15 RCTs and 10 observational studies included only CABG patients	CR	• Primary outcome: mortality • Secondary outcomes: serious adverse effects, QoL, return to work, function, and cost-effectiveness. • Meta-analysis: CR linked to earlier return to work vs. usual care (RR 0.69; 95% CI 0.50–0.95 and RR 0.58; 95% CI 0.46–0.73). • CABG subgroup**:** CR associated with a higher rate of return to work vs. usual care (RR 0.71; 95% CI 0.50–0.99 and RR 0.58; 95% CI 0.46–0.73).	The intensity varied from 20 to 30 minutes per day, three times a week, for up to 6 months.
Mortensen et al.[14] (2022)	Systematic review	• Patients with post-CABG, post-valve surgery, or combined procedures • Total patients: 39,801	• 45 studies: 8 registry studies, 6 RCTs, 1 non-RCT, 18 cohort studies, 1 mix-method study, 2 case-control studies, 9 cross-sectional studies	6 studies discussing CR	• There is no forest plot or heterogeneity assessment in this study. • The average time to return to work in this study is 30 weeks. • 34% of patients did not return to work. • Positive predictors: normal EF, no angina or post-op chest pain, male sex, younger age, white-collar job. • Negative predictors: female sex, depression, low education/income, and significant comorbidities. • In 6 studies on post-CABG rehabilitation, return-to-work time ranged from 9.3 to 32.9 weeks, with return-to-work rates of 34% to 90.3%. • Positive factors to return to work: younger age, male sex, white-collar job, pre-op employment, rehab participation, and high QoL. • Negative factors to return to work: pre-op leave, financial stress, poor health perception, comorbidities, and physically demanding jobs. • Delaying factors caused by: angina, ≥3 grafts, more extended hospital stay, physical workload, depression, negative mindset, and no rehabilitation.	In 6 studies discussing CR, the follow-up period ranged from 6 months to 5 years.

Table 2. Summary (cont.)

Author (Year)	Study Type	Population	Study Samples	Intervention	Outcome	Intervention Period or Follow Up
Pedersen et al.[15] (2023)	Prospective studies	• Patients diagnosed with ischemic heart disease in Denmark from 2014 to 2018, with post-PCI and post-CABG, who were employed before the procedure. • Total patients: 24,509	N/A	Comprehensive CR including physiotherapy, dietary counseling, medical and nursing consultations, and psychological support.	• Patients with fewer comorbidities were more likely to participate in CR • In the matched population, where this bias was reduced, CR increased the likelihood of returning to work • Patients who received CR had the following probabilities of returning to work: • Lower likelihood at 3 months (OR 0.81, 95% CI: 0.77–0.84) • Higher but non-significant probability at 6 months (OR 1.02, 95% CI: 0.97–1.08) • Higher probability at 9 months (OR 1.08, 95% CI: 1.02–1.15) and 12 months (OR 1.20, 95% CI: 1.13–1.28) • The rehabilitation group that underwent CABG had a higher return-to-work rate at 6 months (OR 1.02, 95% CI: 0.88–1.19), though the result was not statistically significant.	• CR was provided for 13 weeks; no data on the intensity per week or per day • Follow-up was conducted at 3, 6, 9, and 12 months.

Description: CABG=Coronary Artery Bypass Graft Surgery, RCT=Randomized Controlled Trials, CR=Cardiac Rehabilitation, QoL=Quality of Life, EF=Ejection Fraction, PCI=Percutaneous Coronary Intervention

Table 3. Critical Appraisal of Included Systematic Reviews Using the Centre for Evidence Medicine, University of Oxford Criteria

Studies	Blokzijl et al.[13] (2018)	Mortensen et al.[14] (2022)
Are the results of the review valid? (Validity)		
What question (PICO) did the systematic review address?	Yes. In this systematic review, the criteria for the subjects, interventions, and outcomes to be analyzed are clearly described.	Yes. In this systematic review, the criteria for the subjects and outcomes to be analyzed are described. No intervention or comparator is mentioned in the search methodology.
Is it unlikely that important, relevant studies were missed?	Yes. The methods section explains that this review used the PRISMA method. The study outlines the search strategy and electronic databases used, including the Cochrane Library, PubMed/MEDLINE, and EMBASE up to October 18, 2017.	Yes. The methods section explains that this review used the PRISMA method. The study lists the search strategy and databases, including Medline, CINAHL, Embase, and Google Scholar, with a 30-year timeframe (from January 1, 1988, to December 31, 2018).
Were the criteria used to select articles for inclusion appropriate?	Yes. The inclusion and exclusion criteria of the systematic review are clearly stated, with specific subjects, interventions, and outcomes.	Yes. The inclusion and exclusion criteria of the systematic review are clearly presented with specific subjects and outcomes.
Were the included studies sufficiently valid for the type of question asked?	Yes. The selected articles consist of 18 RCTs and 15 observational studies involving 3,654 patients. 25 studies (15 RCTs and 10 observational studies) included only CABG patients. The systematic review assessed study quality using the GRADE method.	Yes. Most selected articles are quantitative studies, but there are also seven clinical studies and 18 cohort studies. This systematic review did not perform a quality assessment of each article. Study quality is low (for return-to-work outcomes) or very low (for mortality and serious adverse effects).
Were the results similar from study to study?	No. There is heterogeneity in the assessment of QoL and functioning outcomes.	Unclear. Heterogeneity is not discussed in this systematic review. Most of the articles used were CABG studies.
What were the results?	A forest plot and heterogeneity assessment are included in the study. The existing evidence does not support drawing reliable conclusions regarding the effectiveness of CR after cardiac surgery. Return to work is faster with exercise-based CR compared to usual care.	There is no forest plot or heterogeneity assessment in this study. The average time to return to work in this study is 30 weeks. 34% of patients did not return to work. Positive predictors: normal EF, no angina or post-op chest pain, male sex, younger age, white-collar job. Negative predictors: female sex, depression, low education/income, and significant comorbidities. In 6 studies on post-CABG rehabilitation, return-to-work time ranged from 9.3 to 32.9 weeks, with return-to-work rates of 34% to 90.3%. Positive factors to return to work: younger age, male sex, white-collar job, pre-op employment, rehab participation, and high QoL. Negative factors to return to work: pre-op leave, financial stress, poor health perception, comorbidities, and physically demanding jobs. Delaying factors caused by: angina, ≥3 grafts, more extended hospital stay, physical workload, depression, negative mindset, and no rehabilitation.

Table 4. Critical Appraisal of a Prognostic Study Using the Centre for Evidence Medicine, University of Oxford Criteria

Studies	Pedersen et al.[15] (2023)
Are the results of the study valid? (Internal Validity)	
Was the defined representative sample of patients assembled at a common (usually early) point in the course of their disease?	Yes. Patient selection was carried out using data from the Danish National Patient Registry, specifically patients with myocardial infarction who underwent percutaneous coronary intervention and coronary artery bypass grafting.
Was the patient follow-up sufficiently long and complete?	Yes. Return to work was assessed at 3, 6, 9, and 12 months after hospital discharge.
Were outcome criteria either objective or applied in a 'blind' fashion?	Unclear. Outcome assessment was conducted using a database; however, it was not specified whether blinding was used during the evaluation.
If subgroups with different prognoses are identified, did adjustment for important prognostic factors take place?	Yes. Subgroup analyses were conducted for populations undergoing acute PCI, PCI, and CABG. A matching process was performed.

Discussion

CR is a structured set of activities aimed at helping patients with coronary artery disease, especially those who have experienced ACS, reintegrate into daily life and society. It acts as a form of secondary prevention, reducing both morbidity and mortality by improving left ventricular function and autonomic cardiac regulation.[10] According to the American Heart Association, rehabilitation is recommended post-revascularization, both during hospitalization and in outpatient settings, due to its association with lower mortality and hospital readmissions, and improved quality of life.[16]

A key factor in evaluating CR's effectiveness is its impact on a patient's ability to return to work. Salzwedel et al.[17] found that individuals who returned to work had significantly higher left ventricular ejection fractions than those who did not. Similarly, VO_2 peak values measured through cardiopulmonary exercise testing (CPET) were significantly higher in the return-to-work group (24.7 ± 6.6 vs. 21.0 ± 5.2 ml/min/kg).[17]

The systematic review by Mortensen et al.[14] is central in assessing this association. It included six studies examining return to work after PCI, showing that time to return ranged from 9.3 to 32.9 weeks, with return rates of 34% to 90.3%. While encouraging, the review also highlighted several limitations. There was potential bias in study selection, though efforts were made to blind the screening process and to update the literature search before publication to capture the most recent evidence.

Pedersen et al.[15] provided further insight into the timeline of work reintegration. Initially, patients not enrolled in rehabilitation returned to work more quickly than those undergoing rehabilitation. However, this early advantage faded over time. At six months post-discharge, return-to-work rates in the rehabilitation group surpassed those in the non-rehabilitation group, and this trend became more pronounced at the 12-month mark. The study thus demonstrated the long-term benefits of CR, despite a temporary delay in returning to work.[15] These findings were consistent with those from Worcester et al.[18], who observed that although CR may initially delay return-to-work, it ultimately supports a safer and more sustained return.

A case consistent with these findings involved a patient who underwent staged 6MWT and treadmill testing during and after Phase II CR. Over time, the patient's 6MWT distance increased by 185 meters from Phase I to early Phase II and by 275 meters from early to late Phase II.[19] Sheraz et al. [19] identified the minimal clinically important difference for post-PCI patients as 195 meters, suggesting that this patient achieved a meaningful functional improvement.[20]

Energy demands of different occupations are an important consideration. Office jobs typically require 1.3–1.6 METs, with a maximum around 3.3 METs.[20] The patient in the case reached 3.83 METs by early Phase II, indicating sufficient capacity for desk-based work. This aligns with recommendations from the World Health Organization and the Royal College of Surgeons, which state that non-manual workers may resume duties within six weeks of PCI, and manual laborers within 6–12 weeks [20]

Age, education, and job type are significant predictors of work resumption. Cauter et al. [21] found that patients under 50 were 3 times more likely to return to work, and those aged 50–58 were 2 times as likely. Educational background also plays a role. Higher levels of education, such as a college degree, were linked to higher work returns in the China PEACE study.[22] The study by Waszkowska and Szymczak[23] similarly reported that younger, more educated individuals were more likely to resume employment post-infarction.

Blokzijl et al.[13] specifically explored socioeconomic outcomes following PCI in working-age patients. Their study showed that 85% of patients returned to work within one year, and participation in CR was significantly associated with better employment outcomes. Importantly, patients in rehabilitation programs reported fewer sick days and a quicker full return to their pre-event workload. These results reinforce that structured rehabilitation supports not only physical recovery but also economic reintegration and work sustainability.[13]

Gender differences also emerge in rehabilitation goals. More men than women cited returning to work as their primary motivation during rehabilitation.[24] This can be explained by how men often felt financial pressure to support their families, potentially influencing their urgency to return to employment.[25]

Occupation type plays a crucial role in recovery timelines. Office workers generally returned within three months, whereas those with physically demanding jobs required up to six months.[14] Patients with pre-existing employment are more likely to return to work, likely due to clearer occupational pathways and social support. However, comorbid conditions like hypertension can impede return due to the complexity of disease management. [21]

The case discussed supports this evidence. The patient, a civil servant primarily engaged in sedentary work, underwent revascularization and showed a strong functional recovery. With an ejection fraction of 62.8%, absence of ischemia or arrhythmia on treadmill testing, and improvement in 6MWT results, the patient met all recommended thresholds for safely returning to a low-energy-demand occupation. This result is also consistent with the European Society of Cardiology's 2020 guidelines on cardiovascular rehabilitation; individuals recovering from ACS, cardiac surgery, or percutaneous intervention should be referred to an early exercise-based CR program, ideally starting shortly after hospital discharge and continuing for approximately 8 to 12 weeks following the cardiac event.[26]

Pedersen et al.[15] acknowledged limitations in their study, particularly regarding the assumption of rehabilitation participation based on registry data. Patients were identified from four data sources, and inclusion in the CR group was inferred if rehabilitation occurred within three months post-discharge, even if the referral reason was not always documented. This could introduce misclassification, making it difficult to isolate the effects of cardiac versus general rehabilitation.[15] Despite this, the study's strengths include its use of linked national healthcare databases, allowing for robust adjustment of confounders and minimizing selection bias through the use of comparable control and intervention groups.

This study is based on a single patient case, involving a 55-year-old male with a history of ischemic heart disease who underwent coronary artery bypass grafting. As a single case report, the findings may not be generalizable to broader populations of all patients with similar conditions. Therefore, the conclusions drawn from this case may not reflect the wide range of situations patients experience after cardiac surgery.

This evidence-based report is an initial step in exploring the impact of CR on returning to work during post-surgical recovery. The findings may serve as a foundation for further research and

more detailed patient monitoring to identify key factors influencing long-term recovery outcomes and return to employment. In this patient's post-cardiac surgery care, CR played an important role in supporting physical recovery and enabling the patient to return to work. Ongoing monitoring and support during the recovery process are essential to ensure a better quality of life and a safe return to daily activities.

Conclusion

This case demonstrates the significant positive impact of structured CR on a 55-year-old patient following ACS and CABG, who successfully returned to work as a civil servant. The patient exhibited marked improvements in physical capacity, as shown by increased 6MWT distance and a treadmill test without signs of ischemia or arrhythmia, achieving a peak metabolic equivalent of task (MET) of 7.6. The case underscores the critical role of cardiac rehabilitation in accelerating recovery and improving functional outcomes after cardiac surgery. It highlights that early, structured rehabilitation can substantially shorten the time to return to work, especially when combined with favorable patient characteristics such as younger age, male sex, higher education, less physically demanding jobs, preserved cardiac function, and good overall capacity. CR should be considered an essential element of post-surgical care, with tailored programs addressing individual patient factors to optimize return-to-work success and enhance long-term recovery and quality of life.

Consent for Publication

Written informed consent for publication of any personal data or images included in this manuscript has been obtained from the patient. The patient was informed about the nature and purpose of the publication, and their consent was given voluntarily. All necessary precautions have been taken to protect patient confidentiality.

Conflict of Interest

There is no conflict of interest in the preparation of this case report.

Author's Contributions

Tresia F.U. Tambunan and Najwa Wulandari contributed to the study design and data analysis. Najwa Wulandari was also responsible for data collection. Dave N. Kurnain and Helisa R.P. Sianipar contributed to manuscript writing, editing, and language revision.

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