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Research Article

Return to Work after Uncomplicated Acute Myocardial Infarction

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Abstract

Background: The economic burden and prevalence of cardiovascular disease is substantial. While current treatment focuses on swift revascularization, recent investigations highlight the potential benefits of structured follow-up to enhance post-MI patient quality of life.

Objective: This study explores factors influencing early return to work for patients following an acute myocardial infarction.

Methods: 143 MI patients were randomized into intervention (structured sick-leave program) or conventional care groups. Medical risk factors, socio-economic factors, data including demographic data, were collected. Outcome measures included sick-leave duration and quality of life assessed by Utility-Based Quality of Life-Heart (UBQ-H) and Medical Outcomes Study Short Form-36 (SF-36) questionnaires.

Results: Socio-economic predictors of early return to work included non-manual job category, self-employment, and higher education. Higher self-reported quality of life (SF36 and UBQ-H utilities) also correlated with early return to work.

Discussion: Our findings align with previous research, emphasizing the association between socio-economic factors and early return to work after uncomplicated MI. A structured sick-leave program, as discussed in previous papers, proves effective in reducing absenteeism without negatively impacting quality of life, reinforcing the need for tailored programs for post-MI patients.

Conclusion: This study supports the implementation of structured sick-leave programs for post-acute coronary syndrome patients, emphasizing the role of socio-economic factors in facilitating early return to work.

Introduction

The economic burden and prevalence of cardiovascular disease is substantial [1,2]. Current treatment modalities for individuals experiencing myocardial infarction, such as percutaneous coronary intervention, typically prioritize swift revascularization and early mobilization in the initial days following the event [3-5]. Traditionally, there has been a disproportionate research focus on optimizing the immediate treatment of acute myocardial infarctions compared to the subsequent follow-up procedures [6]. Nevertheless, recent investigations have illuminated the potential benefits of structured follow-up in enhancing the quality of life for patients after myocardial infarction [7-9]. In previous papers we have shown that a structured sick-leave program following an uncomplicated myocardial infarction is a cost-effective method to decrease the number of days absent from work, without affecting quality of life negatively [10,11].

In this paper, we aim at exploring which socio-economic factors that favors early return to work for patients after an acute myocardial infarction.

Methods

Participants and Randomization

One hundred and forty-three patients who were admitted to Oslo University Hospital due to an acute myocardial infarction were included in the study. All patients were assessed against the inclusion/exclusion criteria (Table 1). Patients were randomized into either the intervention group or to conventional care group. Randomization was performed by means of simple randomization by random allocation to study groups after each inclusion [12]. The random allocation was performed by drawing a numbered ticket, were the number corresponded to one

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Table 1: Inclusion/Exclusion criteria.

Criteria	Inclusion	Exclusion
Age	<65	>65
Employment	Regular, full-time	None / Sporadic
		Professional drivers
Complications from AMI		Heart failure
		Maligant arrhythmia
		Major bleeding
		Coronary artery by-pass surgery.

Table 2: Baseline characteristics.

Characteristics	Conventional (n=71)	Intervention (n=72)
Physical characteristics		
Sex (M:F)	1.60625	1.565972222
Age	54	54.1
Clinical details on index admission, n (%)		
Index diagnosis (NSTEMI:STEMI)	2.015972222	2.098611111
Prior AMI or PCI	19	21
Coronary risk factors*, n (%)		
Family history for coronary artery disease	18 (25.2%)	23 (31.9%)
Hypercholesterolemia	32 (44.8%)	34 (46.9%)
Hypertension	30 (42%)	32 (44.6%)
Current smoker	15 (21%)	14 (19.3%)
Diabetes Mellitus	12 (17.8%)	11 (15.1%)
Obesity	21 (29.4%)	24 (33.1%)
Medication at discharge from primary hospitalization, n (%)		
Dual antiplatelet therapy	71 (100%)	72 (100%)
Antiarrhythmic agent	8 (11.2%)	10 (11%)
β-blocker	69 (96.6%)	71 (97.9%)
ACE-I	27 (37.8%)	29 (40%)
Diuretic	11 (15.5%)	10 (13.8%)
Insulin	7 (9.8%)	4 (5.5%)
Oral hypoglycemic agent	6 (8.5%)	6 (8.2%)
Statin	71 (100%)	72 (100%)

"M: male; F: female; AMI: acute myocardial infarction; PCI: percutaneous coronary intervention;
ACE-I: angiotensin-converting-enzyme inhibitors.
** Family history of coronary artery disease: first degree relative aged < 60 years with an acute coronary event; hypercholesterolemia: total cholesterol level, 5,0 mmol/L; hypertension: blood pressure, 140/90 mmHg; diabetes: fasting plasma glucose level, 7.8 mmol/L; obesity: body mass index, > 30 kg·m^{-2}). All patient data were collected upon discharge from primary hospitalization."*

Table 3: Qualitative predictors associated with RTW.

Return to work	p-value
Marital status	0.751
Educational level	**0.019**
Gender	0.489
Salary	0.283
Self-employed	**<0.001**
Non-manual job	**0.034**

Chi-squared test of the association between timing of RTW and qualitative socioeconomic variables.

of the two study groups. The number of tickets that were prepared for the study was set after calculating sample size and ensured balanced randomization between the study groups. Sample size calculations showed that about 50 patients per study groups would allow 80% power for detecting a clinically significant difference in each of the SF-36 health domains with P=0.05 [13,14]. A total of 100 patients would also offer greater than 80% power to detect a clinically worthwhile 0.1±0.2 SD difference in utility scores on the UBQ-H questionnaire [15]. To cover for patients lost to follow-up it was decided to include

Table 4: Quantitative predictors associated with RTW.

RTW	p-value	HR	95% CI
Age	0.325	1.028	0.996 - 1.060
Smoker	0.814	0.992	0.982 - 1.004
BMI	0.791	1.009	0.954 - 1.068
SF36 general Health score	**0.012**	**0.915**	**0.854 - 0.980**
UBQ-H score	**0.007**	**0.898**	**0.830 - 0.971**

Univariate Cox regression of the association between timing of RTW and quantitative variables

Table 5: Predictors associated with RTW.

RTW	p-value	HR	95% CI
UBQ-H score	**0.029**	**0.906**	**0.836 - 0.999**
Upper secondary school	0.681	1.071	0.704 - 1.641
Vocational degree	0.441	1.082	0.864 - 1.348
University degree	**0.004**	**3.324**	**1.865 - 6.287**
Self-employed	**<0.001**	**2.431**	**1.184 - 4.271**
Employed	0.424	0.986	0.961 - 1.009

Multivariate Cox regression analysis for predictors of RTW

about 120 patients in the study. For all patients we collected a full medical history, demographic data, marital status, education level, professional category, and salary range.

ClinicalTrials.gov Identifier: NCT01108653

Study Groups

Patients randomized to the intervention group were given a structuralized program with full- time sick-leave for 2 weeks after discharge. They were also given a telephone number to a cardiologist at the department of cardiology, available for support and questions during office time. After the initial two-week sick leave, the patients were encouraged to return to work full-time or part-time according to an individual adaptation. The general practitioner of the patients was also instructed to help the patients to go back to work as soon as possible. All patients were transferred back to their local hospitals after potential PCI therapy at Oslo University Hospital. The conventional group was then sick listed according to the discharging doctor's assessment and received no special follow-up or advice on when to return to work.

Outcome Measures

Sick-leave Duration

The length of every patient's absence from work was recorded at the 12-month control. The duration of sick leave was calculated from the day of discharge from the hospital to the first day back to paid work.

Quality of Life

Quality of life measures were performed at baseline and at 12 months using the Utility- Based Quality of Life – Heart (UBQ-H), and the Medical Outcomes Study Short Form-36 (SF36), and questionnaires.

The SF-36 from the RAND Corporation is a well-established survey of patient health, both physical and mental, and is validated for the use in monitoring and assessing care outcomes in adult patients. The SF-36 guides suggest that a difference of 10 points between groups per domain indicates a clinically significant difference [13,14]. The UBQ-H was developed specifically for use in coronary artery disease. Components of UBQ-H include physical, psychological and social measures. It also includes three summary measures of quality of life: A time trade-off item, a rating scale and an ordinal health assessment item [15].

Statistical Analysis

In this study 143 patients were included to cover for patients lost to follow-up. Statistical analysis was performed using the SPSS Statistics 26 software. Data was tested for normality using Kolmogorov–Smirnov test. Unpaired t tests, χ2 tests and Mann–Whitney U tests for non-normal data were used for comparisons between groups. Statistical significance was inferred when P<0.05. All results are presented unadjusted for multiple comparisons.

Results

Study Population and Characteristics

The study comprised a total of 143 patients. However, 17 individuals were lost to follow-up, with 13 patients failing to attend scheduled controls despite attempts through phone calls and mail, and four being excluded due to concurrent medical conditions such as cancer and debilitating injuries.

All baseline characteristics were balanced across the study groups, as indicated in Table 2. Among the 143 patients initially enrolled, 98 (68.5%) received an index diagnosis of NSTEMI, while 45 (31.5%) had an index diagnosis of STEMI. Moreover, 140 patients (97.9%) underwent PCI as the primary treatment, while 3 patients (2.1%) received intravenous thrombolytic therapy as the primary mode of treatment. Additionally, 41 patients (28.7%) had a previous history of AMI or PCI.

Absence from Work Results

The whole study group had a mean of 18.8 (CI 95% 17.9–19.7) days absent from work. The conventional group had a mean of 20.4 (CI 95% 18.9-21.8) days absent from work, while the number for the structuralized group was significantly lower, with a mean of 17.2 (CI 95% 16.2–18.2) days absent from work. A two-sample t-test gives an estimated p-value < 0.001, making the difference in absence between the two groups statistically significant.

Predictors of Time to Return to Work

Analysis of qualitative demographic and socioeconomic variables, using the chi-square test, shows a significant correlation between early return to work and non-manual job category (p=0.034), self-employment status (p<0.001), and educational level (p=0.019) (Table 3).

For quantitative variables such as age, BMI, and SF36 and UBQ-H utilities, univariate Cox regression analysis was utilized. The findings indicate that only SF36 (p=0.012) and UBQ-H (p=0.007) utilities reporting higher quality of life exhibited associations with early return to work (Table 4).

Multivariate analysis of qualitative and quantitative variables, indicates that possessing a university degree (p=0.004), being self-employed (p<0.001), and reporting a higher quality of life (p=0.029) were factors significantly associated with early return to work (Table 5).

Discussion

Our results fall in line with previously published results, where early return to work after an uncomplicated myocardial infarction was found to be associated with socio-economic factors [16,17].

Stendardo et al, found in their 2018 paper a similar association between early return to work and socio-economical factors as our study presents [16]. They also conclude that early return to work is more related to socio-economical variables than clinical variables. Interestingly, Sun et al, published in 2022 a prospective longitudinal cohort study that found a significant association between both socio-economical and clinical variables for early return to work [17].

Comparatively, these finings that indicate that early return to work is associated with clinical variables such as comorbidities and post-infarction complications, as well as with socio-economic factors such as employment status and level of educations, have also been found in other studies [18-20]. Furthermore, the amount of time absent from work after a myocardial infarction varies greatly in around the world and is likely also dependent on local societal factors [2,7-9].

In our previous papers we discuss the benefits of a structured sick-leave program following an uncomplicated myocardial infarction [10,11]. Our finding indicate that such a program can help reduce time absent form work, without affecting quality of life negatively, all while being cost-effective from a health-economic perspective. The findings in this paper falls in line with previous research on the subject and can further help tailor a structured sick-leave program for patients following an uncomplicated myocardial infarction.

The major limitations of our study included the relatively small sample size and lack in continuity in the inclusion and follow-up of the patients. The small sample size is likely to have limited the ability to detect reliably smaller, yet possibly still clinically important, changes that may exist in quality of life. It is also important to note that our findings apply to a select group of patients under the age of 65, without any form of post-MI complications.

The findings of our study strengthen the case for a structured sick leave program to all patients after acute coronary syndrome. However, the limitation in the study warrants further investigation into this field, including larger cohorts and longer follow-up.

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Conflicts of Interests

None declared

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Sample Data Availability Statements

The data underlying this article cannot be shared publicly due to [Data cannot be shared for ethical/privacy reasons.]. The data will be shared on reasonable request to the corresponding author.

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