BRIEF REPORT

Determinants of Return to Work After Multicomponent Cardiac Rehabilitation

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Abstract

Objectives: To explore predictors of return to work in patients after acute coronary syndrome and coronary artery bypass grafting, taking into account cognitive performance, depression, physical capacity, and self-assessment of the occupational prognosis.

Design: Observational, prospective, bicentric.

Setting: Postacute 3-week inpatient cardiac rehabilitation (CR).

Participants: Patients (N=401) <65 years of age (mean 54.5 ± 6.3y), 80% men.

Interventions: Not applicable.

Main Outcome Measures: Status of return to work (RTW) 6 months after discharge from CR.

Results: The regression model for RTW showed negative associations for depression (odds ratio 0.52 per SD, 95% confidence interval 0.36-0.76, $P=.001$), age (odds ratio 0.72, 95% confidence interval 0.52-1.00, $P=.047$), and in particular for a negative subjective occupational prognosis (expected incapacity for work odds ratio 0.19, 95% confidence interval 0.06-0.59, $P=.004$; unemployment odds ratio 0.08, 95% confidence interval 0.01-0.72, $P=.024$; retirement odds ratio 0.07, 95% confidence interval 0.01-0.067, $P=.021$). Positive predictors were employment before the cardiac event (odds ratio 9.66, 95% confidence interval 3.10-30.12, $P<.001$), capacity to work (fit vs unfit) at discharge from CR (odds ratio 3.15, 95% confidence interval 1.35-7.35, $P=.008$), and maximum exercise capacity (odds ratio 1.49, 95% confidence interval 1.06-2.11, $P=.022$). Cognitive performance had no effect.

Conclusions: The patient's perception and expectation regarding the occupational prognosis play a crucial role in predicting return to work 6 months after an acute cardiac event and CR. These findings highlight the importance of the multimodal approach, in particular psychosocial components, of CR.

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The occupational resumption is a crucial step in the coping of the disease for younger patients after an acute coronary syndrome (ACS) or a coronary artery bypass graft (CABG). However, in Germany, 30% of patients aged below 65 years fail to return to work (RTW) in midterm course after cardiac rehabilitation (CR).[1]

The international literature provides some clinical and psychosocial predictors of RTW after ACS or CABG, in particular the severity of ACS, cardiopulmonary function and comorbidities as well as working conditions, depression, and perceived health.[2-6] Nevertheless, specific therapeutic approaches and counseling offers within CR for the improvement of the occupational prognosis are rare and not sufficiently effective. Dedicated knowledge of influencing factors, barriers and facilitators should help to understand the comprehensive biopsychosocial mechanisms underlying non-RTW and may be the basis for optimized CR programs.

We aimed to explore potential predictors of RTW in patients after ACS and CABG, taking into account cognitive performance,

depression, physical capacity, and self-assessment of the occupational prognosis, respectively.

Methods

Design and participants

We conducted a prospective observational study in 2 CR clinics with the primary objective to investigate the effect of the cognitive performance on the success of patient education in CR (CoCaRehab: Cognition in Cardiac Rehabilitation)[7] and, secondary, the status of RTW 6 months after CR. The latter is the subject of the current brief report.

Between September 2014 and August 2015, patients aged below 65 years after an acute cardiac event including ACS and CABG were consecutively enrolled at admission to CR. The rehabilitation program started regularly for all patients within 14 days of acute hospital discharge and was conducted as a standardized multimodal 3-week inpatient program including a supervised exercise training, risk factor management, psychological and social support, patient education, and counseling on life style adjustment.

Data collection and outcome measure

Sociodemographic data (eg, age, sex, educational level), clinical parameters (eg, cardiovascular risk factors, relevant comorbidities, left ventricular ejection fraction, and New York Heart Association classification of heart failure), and occupational data including the patients' employment status before CR were documented at admission to CR. Additionally, the 6-minute walk test and bicycle ergometry to determine the maximum exercise capacity as well as the Hospital Anxiety and Depression Scale were conducted at admission and discharge from CR. The cognitive performance at admission and discharge was tested using the Montreal Cognitive Assessment (MoCA)[8] by trained study nurses. Finally, patients assessed their own midterm occupational prognosis (Single choice question: How do you rate your occupational prognosis in half a year? Answer options: employment, unemployment, incapacity for work, or retirement) at discharge from CR. The status of RTW 6 months after CR as outcome measure was determined by a postal follow up survey.

Statistics

Continuous variables are presented as means ± SD, and categorical variables as absolute values and percentages. The status of RTW (yes vs no) was analyzed by a binary logistic regression model with stepwise backward selection to examine predictors of occupational resumption. Age, employment before ACS or CABG, physical fitness (6-minute walk test and exercise capacity in bicycle ergometry) as well as depression and anxiety scores by Hospital Anxiety and Depression Scale at admission to CR and as changes in course of

List of abbreviations:

ACS	acute coronary syndrome
CABG	coronary artery bypass grafting
CR	cardiac rehabilitation
MET	metabolic equivalent of the task
MoCA	Montreal Cognition Assessment
RTW	return to work

Table 1 Baseline characteristics (N=401)

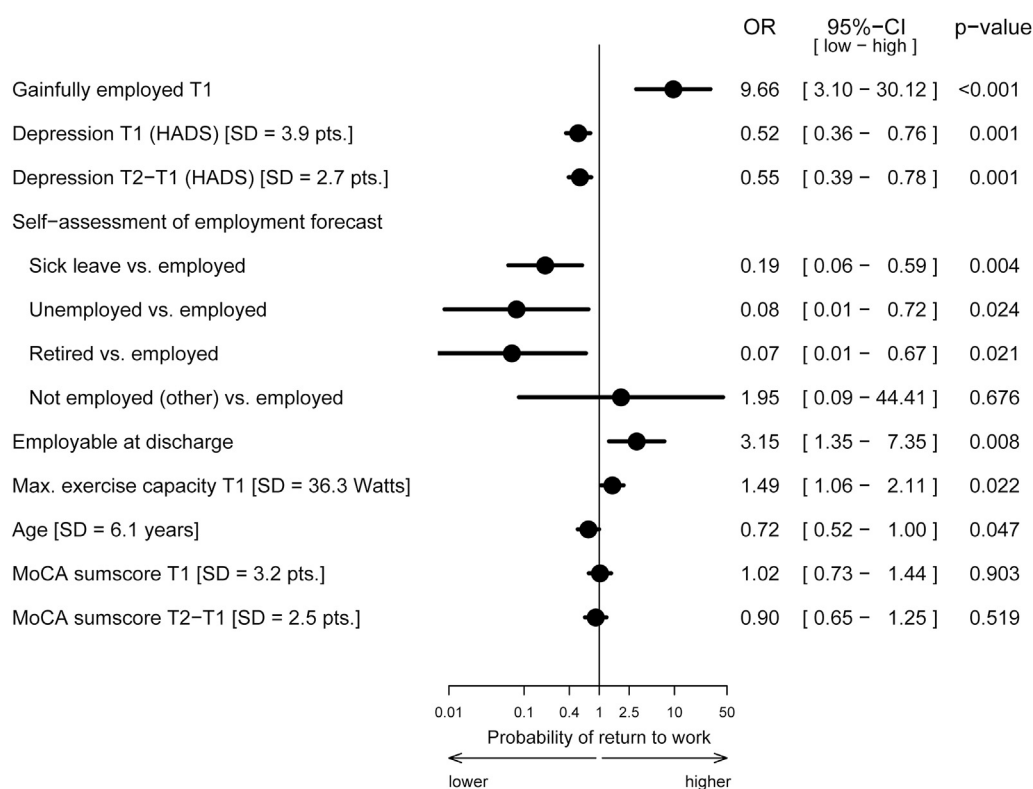| Parameter	Mean ± SD or n (%)
Sociodemographic data	
Age (y)	54.5±6.3
Sex (male)	321 (80.0)
Education	
<10th grade	58 (14.5)
Middle school degree	263 (65.6)
High school diploma	80 (20.0)
Vocational education	
Without	20 (5.0)
Vocational training (dual system)	318 (79.3)
College/university	63 (15.7)
Occupation (employed)	341 (85.0)
ACS treatment	
PCI (%)	269 (67.1)
CABG	114 (28.4)
Conservative procedure	17 (4.2)
Cardiovascular symptoms	
LVEF (%)/<45%	55.4±7.6/30 (7.5)
NYHA classification I/II/III-IV (n=399)	291 (72.9)/96 (24.1)/12 (3.0)
Cardiovascular risk factors	
Hypertension	279 (69.6)
Diabetes mellitus	92 (22.9)
Dyslipidemia	261 (65.1)
Smoker/ex-smoker (<12mo)	228 (56.9)
Comorbidities	248 (61.8)
COPD	30 (7.5)
Stroke	14 (3.5)
PAD	22 (5.5)
Orthopaedic disease	148 (36.9)
Mental disease	44 (11.0)
Functional parameters	
6-min walking distance (m)	416.5±84.2
Exercise capacity (W)*	109.2±36.0
HADS: depression (points)	5.4±3.8
HADS: anxiety (points)	6.5±4.1
MoCA (points)	26.1±3.0

Abbreviations: COPD, chronic obstructive pulmonary disease; HADS, Hospital Anxiety and Depression Scale; LVEF, left ventricular ejection fraction; NYHA, New York Heart Association; PAD, peripheral artery disease; PCI, percutaneous coronary intervention.
  * In bicycle exercise stress test.

CR, psychological comorbidity, chronic obstructive pulmonary disease, history of stroke, MoCA values, capacity to work at discharge from CR and self-assessment of occupational prognosis were taken into account in the modelling. Due to the study objective, MoCA values were kept in the model even if there was no significance. The odds ratios of the independent predictor variables are shown with 95% confidence intervals and P values. Effects with a P value of less than .05 were considered statistically significant. Calculations were done in SPSS 23.0.[a]

Ethics and study registration

All patients provided informed written consent before enrollment. The study was approved by the Ethics Committee of the Faculty of

	OR	95%−CI [low − high]	p-value
Gainfully employed T1	9.66	[3.10 − 30.12]	<0.001
Depression T1 (HADS) [SD = 3.9 pts.]	0.52	[0.36 − 0.76]	0.001
Depression T2−T1 (HADS) [SD = 2.7 pts.]	0.55	[0.39 − 0.78]	0.001
Self−assessment of employment forecast			
Sick leave vs. employed	0.19	[0.06 − 0.59]	0.004
Unemployed vs. employed	0.08	[0.01 − 0.72]	0.024
Retired vs. employed	0.07	[0.01 − 0.67]	0.021
Not employed (other) vs. employed	1.95	[0.09 − 44.41]	0.676
Employable at discharge	3.15	[1.35 − 7.35]	0.008
Max. exercise capacity T1 [SD = 36.3 Watts]	1.49	[1.06 − 2.11]	0.022
Age [SD = 6.1 years]	0.72	[0.52 − 1.00]	0.047
MoCA sumscore T1 [SD = 3.2 pts.]	1.02	[0.73 − 1.44]	0.903
MoCA sumscore T2−T1 [SD = 2.5 pts.]	0.90	[0.65 − 1.25]	0.519

Probability of return to work

lower   higher

Fig 1 Predictors of RTW at 6 months' follow-up. Self-assessment of occupational prognosis has a high predictive value for the status of RTW: an expected incapacity to work reduced the probability of RTW by 81%, expected unemployment by 92%, and expected retirement by 93%, respectively. Abbreviations: pts., points; T1, admission to cardiac rehabilitation; T2, discharge from cardiac rehabilitation.

Human Sciences of the University of Potsdam (June 2013, May 5, 2014) and registered by the German Register of Clinical Trials and the International Clinical Trial Agency (International Clinical Trials Registry Platform, World Health Organization; registration number DRKS00005502).

Results

Out of 497 enrolled patients, 401 (81%) provided information about their status of RTW at 211±51 days after discharge from CR. Baseline characteristics of these patients (54.5±6.3y, 80% men) are presented in table 1.

Before the index event, 341 patients (85%) were gainfully employed, 45 (11.2%) were unemployed. Besides, 88 patients (21.9%) were on sick leave for more than 1 month before CR. Referring to the last occupation, 243 patients (60.6%) reported to be employee or official (white collar workers), respectively, 112 (27.9%) were workers (blue collar workers), and 45 (11.2%) were self-employed. Ninety-one patients (22.7%) had an occupation with moderate (5-7 metabolic equivalent of the task [MET]) and 81 (20.2%) with heavy work loads[9] (<7 MET), respectively. One MET corresponds to 3.5 mL O_2 per kg body weight per minute.

At discharge from CR, 297 patients (74.1%) were assessed as fit for work by the CR cardiologist. According the self-assessment of the occupational prognosis, 331 patients (82.5%) expected to be employable 6 months after discharge, 28 (7%) believed to be unfit for work. Twenty-two patients (5.5%) assumed unemployment, 17 (4.2%) retirement, and 3 (0.7%) did not expect to work for other reasons.

Objectively, 399 (64.3%) patients returned to work, while 73 (18.2%) stayed on sick leaves a half year after CR. Twenty-three patients (5.7%) were retired and 44 (11%) were unemployed, respectively. The adjusted regression model for the status of RTW showed negative associations for depression, age, and in particular for a negative subjective occupational prognosis. Positive predictors were employment before the cardiac event, capacity to work (fit vs unfit) at discharge from CR, and maximum exercise capacity while the cognitive performance in MoCA had no effect on the probability of RTW (fig 1).

Discussion

Although the investigated patient population after an ACS or CABG is comparatively young, the high burden of comorbidities, including arterial hypertension (70%) or type 2 diabetes (22%) is striking; however, it reflects a typical clinical characterization of patients with premature cardiac event.

The rate of occupational resumption in these patients was comparably low with 64%. Several independent predictors of RTW could be identified. Especially, a negative subjective occupational prognosis is to be emphasized with reduced probability for RTW by up to 93%. There are only a few studies confirming the strong association between patients' expectations for work resumption.[10,11] Nevertheless, the extent of this effect in our investigation is notable. The odds ratios of 0.07-0.19 imply the paramount importance of the patients' perspective for the occupational prognosis and ultimately for the rehabilitation process. In contrast, the negative effect of coexisting depression on clinical

psychosocial outcomes in patients with cardiovascular diseases, which was objected in this study, has already been proven extensively.[11] In consequence of this finding, the planning and course of CR program should be focused on the patients' expectations and perceptions and, if possible, the improvement of this assessment.

However, there was no influence of patients' cognitive capacity on the status of RTW 6 months after discharge from CR. Cognitive impairments within the mentioned patient population are commonly mild pronounced. Additionally, cognitive decline after an acute cardiac event especially after CABG is commonly transitory. Therefore, no severe effects on social environment such as work resumption could be expected.

Study limitations

The CoCaRehab study was designed primarily to investigate the effect of the cognitive performance on the development of disease-related knowledge after CR with RTW as a secondary outcome measure. Therefore, the recent analysis is limited regarding the available choice of parameters. Other important influencing factors such as the socioeconomic status or the characterization of ACS were not considered. Moreover, 96 patients (19%) did not answer the follow up survey. Thus, a selection bias cannot be excluded.

Conclusion

The patient's perception and expectation regarding the occupational prognosis play a crucial role in predicting RTW 6 months after an acute cardiac event and comprehensive cardiac rehabilitation approach. Clinicians should be aware of and implement the patient's perspective already in the planning process of the rehabilitation program.

Due to the high psychosocial, financial, and health implications of occupational reintegration, increased efforts should be made during the period of rehabilitation to offer individual assistance for optimized RTW.

Supplier

a. SPSS 23.0; IBM.

Keywords

Acute coronary syndrome; Cardiac rehabilitation; Coronary artery bypass grafting; Motivation; Rehabilitation; Return to work

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Acknowledgments

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