Centre of Rehabilitation Research

Patient-related Clinical and Sociodemographic Determinants of In-Patient Cardiac Rehabilitation Outcome in Elderly Patients

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Objective

Cardiac rehabilitation (CR) aims at the simultaneous improvement of several outcomes depending on the individual risk factor patterns, fitness and health of patients. The overall success can be measured by the multiple outcome criterion (MOC), which summarizes changes in 13 CR-specific outcomes in a single score. We aimed to determine the impact of several usually available baseline characteristics on CR success as measured by MOC.

Table 1. Need for intervention at admission to CR

Variables of Multiple Outcome Criterion	Need for intervention
Risk factors	
Arterial hypertension	41.9%
LDL cholesterol	53.1%
Triglycerides	32.0%
Physical performance	
Heart rate (resting)	28.6%
Maximal exercise capacity	96.8%
Maximal walking distance	94.6%
Heart failure (NYHA)	77.5%
Angina pectoris (CCS)	8.9%
Subjective health	
IRES-24: pain	88.4%
IRES-24: somatic health	97.2%
IRES-24: Psych. well-being	95.2%
HADS: depression	31.8%
HADS: anxiety	32.4%

LDL, low density lipoprotein; NYHA, New York Heart Association; CCS, Canadian Cardiovascular Society; IRES, Indicators of rehabilitation status; HADS, Hospital anxiety and depression scale

Methods and Material

MOC was calculated for 1,211 patients (70.9±7.0 years, 78.3% men) who were enrolled from February 2009 to June 2010 at 12 cardiac rehabilitation clinics. It measures changes in 13 variables in three major categories (cardiovascular risk factors, exercise capacity, and subjective health) during CR (Tab.1). A multitude of conceivable outcome-related patient characteristics were determined, that might confound the effects of CR on MOC, including sociodemographic variables, baseline parameters of exercise capacity, risk factors and emotional status, comorbidities, duration of hospital stay, as well as laboratory and echocardiographic data. Predictive variables according to univariate statistical tests were subjected to multivariate analysis using a mixed model with random intercept for centre effect.

Results

Patient characteristics are shown in Table 2. The strongest impact on MOC (mean 0.6±0.45) had smoking, female sex, depression, and hypertension. Furthermore, statistically significant effects had duration of hospital stay, heart rate, and maximal exercise capacity as well as the rehabilitation center (Figure).

Performing an exercise ECG as well as a HADS-screening was significant and relevant for the rehabilitation outcome. Patients who did not perform an exercise ECG were older than those who did, were more commonly women, suffered more frequently from comorbidities and complications at the start of rehabilitation, and had a longer duration of hospital stay (Tab. 3).

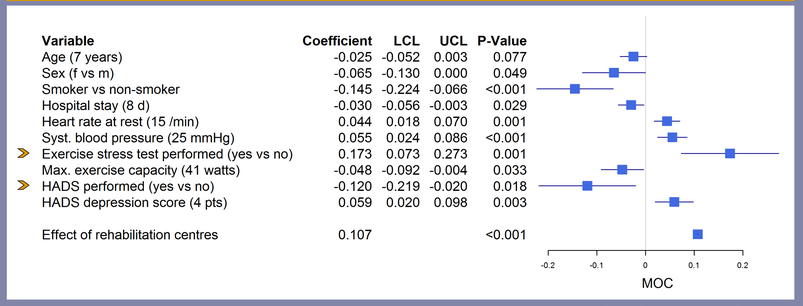
No group differences were registered between those who did or did not fill the HADS questionnaire (Tab. 3).

Table 2. Patient characteristics

Variable	mean±SD
Age (years)	70.9±7.0
Hospital stay (days)	12.5±7.0
Rehabilitation period (days)	20.5±3.0
Gender (m/f)	955 (78.3%)
BMI (> 30 kg/m^2)	199 (16.3%)
Living situation (family/partner)	970 (79.5%)
Education (> secondary school)	515 (42.2%)
Indication	
postoperative	744 (61.0%)
conservative/interventional	471 (38.7%)
Risk factors	
Arterial hypertension	1015 (83.2%)
Hyperlipoproteinemia	963 (78.9%)
Positive family history	513 (42.0%)
Diabetes mellitus	315 (25.8%)
Smokers/Ex-smokers*	161 (13.2%)
Patients with comorbidities	599 (49.1%)
Conspicuous emotional status**	
Anxiety (n=536)	54 (10.1%)
Depression (n=537)	61 (11.4%)

*< 5 years abstinent; hospital anxiety and depression scale ≥ 11; BMI, Body Mass Index

Figure. Predictors of Multiple Outcome Criterion



Continuous variables are z- standardized. The median difference in two randomly selected rehabilitation centers in MOC was considered.
LCL, lower confidence limit of 95% confidence interval; UCL, upper confidence limit;
MOC, multiple outcome criterion; HADS, hospital anxiety and depression scale

Table 3. Performing ECG/HADS: group-specific differences

	Exercise ECG			HADS-D		
	yes	no	p-Value*	yes	no	p-Value*
Age [years]	70.4	72.2	< 0.001	71.0	70.7	0.412
Gender [female, %]	18.7	32.3	< 0.001	22.7	20.8	0.425
Duration of hospital stay	11.8	15.1	< 0.001	12.2	12.8	0.208
Comorbidities [patients, %]	46.4	58.7	< 0.001	48.6	49.5	0.759
Complications (start of CR) [patients, %]	4.8	8.7	0.015	6.1	5.3	0.512

* t-test and chi-square test, resp.

Conclusion

We identified several powerful predictors of the outcome of rehabilitation in elderly patients, which could be used for more targeted treatment control in cardiac rehabilitation.

The choice of rehabilitation centre remains considerable importance for the success of rehabilitation.

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The authors declare that there is no conflict of interest.
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