Research Letter

Cardiac Rehabilitation: Patient-Reported Outcomes Are Decisive for Success

Cardiac rehabilitation in Germany is generally carried out as a 3- to 4-week, multimodal intensive program that aims to positively influence the medical physical factors as well as psychological and socio-medical aspects of the disease. Although rehabilitation provides specific supportive offers as part of the holistic treatment approach (such as social service counseling), 27% of those undergoing rehabilitation of working age do not return to work in their everyday life (1). Long periods of incapacity for work and early retirement are associated with high costs for society and can also have a negative impact on the quality of life and the clinical prognosis of the patient (2). Against this background, the Outcome of Cardiac Rehabilitation (OutCaRe) project aimed to identify and evaluate relevant parameters for the rehabilitation success of under 65-year-olds, to ultimately derive indications for the optimization of rehabilitation measures. This article focuses on parameters that are

equally predictive for the short- and medium-term success of rehabilitation.

Methods

This two-phase project initially included a four-stage, web-based Delphi expert survey with more than 60 experienced physicians, sports/physiotherapists, and psychologists in cardiac rehabilitation. The experts evaluated cardiovascular risk factors as well as parameters of physical performance, social medicine, and subjective health with regard to their importance for the success of rehabilitation. This resulted in 20 agreed-upon “success parameters” for cardiac rehabilitation (3). These indicators were evaluated in a prospective registry study with 1 586 patients in twelve rehabilitation centers (05/2017 – 05/2018) with regard to modifiability during rehabilitation and the predictive power of return to work and health-related quality of life at six months after rehabilitation (4, 5).

TABLE

Indicators of short- and medium-term success of rehabilitation

Parameter	Change during rehab (T1–T0) SES or ± percentage point p-value	Measuring point	Predictive value* for		
			Returning to work OR [95% CI]	Physical quality of life (SF-12, PCS) β [95% CI]	Mental quality of life (SF-12, MCS) β [95% CI]
Physical endurance ability körperliche Leistungsfähigkeit					
Endurance training load in ergometer training (5 Watt)	1.03; <0.001	T0 TΔ	1.09 [1.04; 1.14] –	0.15 [0.03; 0.27] 0.13 [0.01; 0.24]	– –
Subjective well-being/quality of life					
Depression (PHQ-9; points)	0.42; <0.001	T0 TΔ	–	–	–0.41 [–0.60; –0.22]
Subjective well-being (WHO-5; 10 points)	0.71; <0.001	T0 TΔ	– –	– –	– 0.36 [0.03; 0.69]
Physical quality of life (SF-12; 10 points)	0.53; <0.001	T0 TΔ	1.41 [1.20; 1.66] –	4.26 [3.44; 5.08] 2.98 [2.21; 3.75]	– –
Mental quality of life (SF-12; 10 points)	0.49; <0.001	T0 TΔ	1.48 [1.25; 1.75] 1.30 [1.06; 1.60]	0.48 [0.03; 0.92] –	1.20 [0.46; 1.93] –
Physical health (IRES-24; 2 points)	0.43; <0.001	T0 TΔ	– –	1.18 [0.54; 1.81] 0.78 [0.13; 1.43]	– –
Mental health (IRES-24; 2 points)	0.57; <0.001	T0 TΔ	– –	– –	2.90 [1.91; 3.88] 2.54 [1.67; 3.42]
Self-assessed health prognosis (good/very good)	+7.8; <0.001	T0 T1	– –	1.11 [0.05; 2.16] 1.58 [0.49; 2.68]	– –

Parameters are shown that are useful for mapping both the short-term (changes of at least 5 percentage points for categorical variables or standardized effect sizes of > 0.35 [interpretation analogous to Cohen's d] for metric variables with proven statistical significance) as well as the medium-term rehabilitation success (predictive power for return-to-work and / or quality of life at six months after discharge) of cardiac patients proved to be suitable. In the domains „cardiovascular risk factors“ (e.g., smoking behavior, blood pressure) and „social medicine“ (such as self-assessed work ability prognosis or desire for retirement), no parameters were identified that could be used to operationalize both short-term and medium-term rehabilitation success.

* The predictive power was determined in multivariable regression models with backward selection (only the effects in the final models are given). Parameters were included in the models based on their respective characteristics at the start and end of rehabilitation, or as the difference between the two measurement times. Variables considered in the models were age, gender, life situation, level of education, type of rehabilitation (follow-up rehabilitation / general application procedure), diagnoses, comorbidities, experience of stress, smoking behavior, motivation for lifestyle change, blood pressure, cholesterol, body mass index, fasting glucose, physical performance, maximum exercise capacity, endurance load in ergometer training, 6-min walking distance test, pain-free walking distance, desire for retirement, self-assessed occupational prognosis, work capacity, subjective health, depression, anxiety, physical stress, well-being, physical / mental quality of life, subjective physical and mental health and pain, self-assessed health prognosis.

95% CI, 95% confidence interval; β, standardized correlation coefficient; IRES-24, Indicators of Rehabilitation Status-24; MCS, mental component summary; OR, odds ratio; PCS, physical component summary; PHQ-9, Patient Health Questionnaire-9; SES, standardized effect size; SF-12, Short-Form Health Survey; T0, start of rehabilitation; T1, end of rehabilitation; TΔ, rehabilitation course (T1 – T0); WHO-5, World Health Organization Well-Being Index.

For this purpose, parameters of subjective health and social medicine were largely operationalized using generic questionnaires to ensure validity for all entities in cardiac rehabilitation. In particular, depression, cardiac anxiety, subjective well-being, somatic health, pain and mental well-being, health-related quality of life, the patient's desire for retirement, and self-assessed work ability prognosis were recorded. In addition, a large number of socio-demographic and medical-physical factors were documented during the rehabilitation. Six months after discharge, patients were asked about their employment status (primary endpoint) and quality of life (secondary endpoint).

The modifiability of parameters was assessed on the basis of statistical significance (pre/post test according to Wilcoxon or McNemar) as well as on standardized effect sizes >0.35 or changes of more than five percentage points for categorical variables (4). For the prediction of return to work and quality of life, multivariable, multiple imputed logistic (primary endpoint) or linear (secondary endpoint) regression models with backward selection were adapted (5).

The study was approved by the responsible ethics committees and registered in the German Clinical Trials Register (DRKS00011418).

Results

The majority of the parameters tested were found to be statistically and clinically relevant as well as modifiable during rehabilitation. In particular, positive influences could be made on the following parameters: endurance training load, blood pressure, well-being, physical and mental health and pain scale of the indicators of rehabilitation status-24 (IRES-24) questionnaire, motivation for lifestyle change, smoking behavior, and the self-assessed health prognosis. These parameters were good predictors of the immediate success of cardiac rehabilitation at discharge.

In the follow-up survey, 864 (69%) of the 1262 patients (54 ± 7 years, 77% men) were employed. This medium-term success was negatively correlated with an unfavorable subjective occupational prognosis (odds ratio [OR]: 0.34; 95% confidence interval: [0.24; 0.48]) or an expressed desire for retirement (OR 0.33; [0.22; 0.50]) and positively correlated with a higher health-related quality of life and endurance training load (Table). The health-related quality of life at six months after discharge (46 ± 10 or 49 ± 11 points in the 12-Item Short Form Health Survey [SF-12] physical component summary [PCS] or mental component summary [MCS], respectively) was primarily determined by patient-reported outcomes (especially the desire for retirement, heart-related anxiety, health-related quality of life, and physical / mental health in IRES-24).

Modifiable parameters during rehabilitation predicted both the occupational prognosis and the health-related quality of life and comprised endurance stress in ergometer training as well as the

majority of the patient-reported parameters of subjective health (Table).

Discussion

The patient's self-assessment of his/her occupational future, including a desired or expected retirement, turned out to be highly predictive for both the actual return to work and the health-related quality of life at six months after rehabilitation. Therefore, this parameter should be taken into account in a differentiated manner at the start of rehabilitation in order to explore the determining factors. On the one hand, therapeutic strategies can be initiated in a targeted manner; on the other hand, continuous social service support can be initiated at an early stage, and individual measures for the transition to the patient's everyday life can be discussed and/or introduced (as necessary) within this framework. In addition, the perceived mental health of the patient is of great importance. This aspect should be consistently taken into account during rehabilitation, for example through the routine use of appropriate assessments.

The OutCaRe project demonstrated that patient-reported psychosocial parameters have essential informative value for the short- and medium-term rehabilitation results, underscoring the importance of the multimodal transprofessional approach of cardiac rehabilitation, which includes psychological and social service support.

Annett Salzwedel, Heinz Völler on behalf of the OutCaRe investigators
Faculty of Health Sciences Brandenburg, University of Potsdam, Potsdam, Germany, (Salzwedel, Völler), annett.salzwedel@fgw-brandenburg.de
Klinik am See, Rüdersdorf, Germany (Völler)

Conflict of interest statement

The OutCaRe project was supported by the German Federal Pension Insurance. The authors declare that no further conflict of interest exists.

Manuscript received on 16 December 2020, revised version accepted on 12 April 2021

Translated from the original German by Veronica A. Raker, PhD.

References

1. Deutsche Rentenversicherung Bund: Reha-Bericht 2019. www.deutsche-rentenversicherung.de/SharedDocs/Downloads/DE/Statistiken-und-Berichte/Berichte/rehabbericht_2019.pdf?__blob=publicationFile&v=3 (last accessed on 21 April 2021).
2. Cauter JV, Bacquer D, Clays E, Smedt D, Kotseva K, Braeckman L: Return to work and associations with psychosocial well-being and health-related quality of life in coronary heart disease patients: results from EUROASPIRE IV. *Eur J Prev Cardiol* 2019; 26: 1386–95.
3. Salzwedel A, Haubold K, Barnack B, Reibis R, Völler H: Indikatoren der Ergebnisqualität kardiologischer Rehabilitation. *Rehabilitation (Stuttg)* 2019; 58: 31–8.
4. Zoch-Lesniak B, Dobberke J, Schlitt A, et al.: Performance measures for short-term cardiac rehabilitation in patients of working age: results of the prospective observational multicenter registry OutCaRe. *Arch Rehabil Res Clin Transl* 2020; 2: 100043.
5. Salzwedel A, Koran I, Langheim E, et al.: Patient-reported outcomes predict return to work and health-related quality of life six months after cardiac rehabilitation: results from a German multi-centre registry (OutCaRe). *PLOS ONE* 2020; 15: e0232752.

Cite this as:

Salzwedel A, Völler H: Cardiac rehabilitation: patient-reported outcomes are decisive for success. *Dtsch Arztebl Int* 2021; 118: 505–6.
DOI: 10.3238/arztebl.m2021.0211