

# Predictors for Quality of Life in Chronic Heart Disease Following an Ambulatory Cardiac Rehabilitation Program

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## Purpose

Patients with chronic heart disease are known to be at higher risk for limited quality of life (QoL). However, predictors for good and impaired QoL in patients undergoing an ambulatory cardiac rehabilitation (CR) program are largely unknown.

## Methods

- Prospective single-centre cohort study
- completion of a 7-9-week comprehensive outpatient CR program.
- 274 patients included (209 with coronary artery disease (CAD), 32 after valve-repair (surgical and interventional), 26 with congestive heart failure (CHF), and 6 with functional heart complaints)
- QoL determined by the MacNew Heart Disease Health-related QoL (MacNew) Questionnaire 1 year after CR
- Global score ranged from 1-7 (higher scores indicating better QoL).
- Relevant impairment in QoL = less than 5.5 points in the MacNew.

## Results

- Of all 274 patients, 249 (80%) reported good QoL 1 year after CR while 54 (20%) patients reported impaired QoL
- Distribution of baseline characteristics were highly comparable between the two groups (Table 1).
- Physical activity after the CR was significantly reduced in patients with impaired QoL as compared to patients with good QoL (100% vs. 103% of expected Watts, p=0.042).
- Age as well as LVEF before and after the CR did not predict QoL.
- After adjustment for age and sex in a multivariable regression model, **valvular repair** (OR 0.362, p=0.028) remained an *independent, inverse predictor* whereas **physical performance after the CR** (OR 1.022, p=0.013) remained an *independent, direct predictor*.

Table 1 Baseline Characteristics of all Patients

	All Patients n=274 (100%)	Good QoL n=220 (80%)	Impaired QoL n=54 (20%)	p-value
Age - yr	66 (59-72)	66 (59-72)	71 (61-76)	0.026
Male gender – no. (%)	210 (77)	171 (78)	39 (72)	0.392
<b>Indication for cardiac rehabilitation – no. (%)</b>				
Coronary artery disease	209 (77)	169 (77)	40 (74)	0.631
Valvular repair	32 (12)	22 (10)	10 (19)	0.083
Congestive heart failure	26 (19)	22 (10)	4 (7)	0.554
Functional symptoms	6 (2)	6 (3)	0 (0)	0.219
<b>Left Ventricular Ejection Fraction – median (IQR) - %</b>				
Before CR	55 (48-60)	55 (45-60)	55 (50-60)	0.961
After CR	55 (50-60)	55 (45-60)	55 (55-60)	0.417
<b>Ergometry Performance - % expected Watts</b>				
Before CR	69 (59-84)	71 (57-86)	65 (55-75)	0.149
After CR	103 (90-113)	103 (91-114)	100 (80-109)	0.042
<b>MacNew Heart Disease Health-related Quality of Life – median [IQR]</b>				
Global Scale	6.1 [5.7-6.7]	6.3 (6.1-6.7)	5.0 (4.5-5.3)	<0.001
Emotional Scale	6.2 [5.3-6.4]	6.3 (5.8-6.5)	4.6 (4.1-5.2)	<0.001
Social Scale	6.5 [5.9-6.9]	6.7 (6.3-6.9)	5.2 (4.8-5.9)	<0.001
Physical Scale	6.0 [5.2-6.4]	6.2 (5.6-6.6)	4.4 (4.2-5.0)	<0.001



Table 2 Univariable and Multivariable Predictors for Successful Response to Cardiac Rehabilitation

Variables	Univariable Analysis		Multivariable Analysis	
	OR	p-value	OR	p-value
Age – yr	0.969	0.057	0.971	0.108
Male gender	1.342	0.393	1.070	0.868
<b>Indication for cardiac rehabilitation</b>				
Coronary artery disease	1.183	0.631		
Valvular repair	0.491	0.088	0.362	0.028
Congestive heart failure	1.396	0.556		
<b>Left Ventricular Ejection Fraction (LVEF) - %</b>				
Before CR	0.987	0.546		
After CR	0.944	0.142		
<b>Ergometry Performance - % expected Watts</b>				
Before CR	1.013	0.146		
After CR	1.020	0.018	1.022	0.013
Change during CR	1.014	0.160		

## Conclusion

The prediction of Quality of Life after ambulatory cardiac rehabilitation is difficult and varies widely between individuals. Overall, maximal **physical performance at the end of rehabilitation** and **valvular repair** as indication for rehabilitation act as **independent predictors for Quality of Life**.



# Predictors for Good and Poor Response to a Comprehensive Ambulatory Cardiac Rehabilitation Program

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## Purpose

Patients with coronary artery disease (CAD), valvular repair or congestive heart failure (CHF) often undergo ambulatory cardiac rehabilitation (CR) as an alternative to in-patient CR. However, predictors for good and no response to ambulatory CR are largely unknown.

## Methods

- Prospective single-centre cohort study
- completion of a 7-9-week comprehensive outpatient CR program.
- 460 patients (352 with CAD, 57 after valvular repair (surgical and interventional), 38 with CHF, and 13 with functional heart complaints)
- Non-responders were identified at the end of CR if:
  - improvements in physical performance measured by ergometry were  $\leq 10\%$  of the expected value or
  - no improvements in left ventricular ejection fraction could be achieved.

## Results

- Of all 460 patients, 412 (90%) were responders to CR.
- Distribution of baseline characteristics were highly comparable between the two groups (Table 1).
- Non-responders showed a higher median physical performance before CR as compared to responders (77% vs. 67% of expected value,  $p < 0.001$ ).
- In a multivariable regression model, impaired physical performance before CR could be identified as an independent predictor for good response to CR (Table 2).
- For non-responders, no independent predictors could be identified. Of note, sex, age, cardiovascular risk factors and ejection fraction before CR were no predictors for the response to CR ( $p > 0.1$  for all comparisons).
- Time between discharge and CR tended to be higher in the non-responder group without reaching significance (OR 0.99,  $p = 0.055$ ).

Table 1 Baseline Characteristics of the Patients

	All Patients n=460 (100%)	Responder n=412 (90%)	Non-Responder n=48 (10%)	p-value
Age – yr	65 (75-72)	65 (57-72)	65 (59-74)	0.494
Male gender – no. (%)	350 (76)	310 (75)	40 (83)	0.196
Indication for cardiac rehabilitation – no. (%)				
Coronary artery disease	352 (77)	312 (76)	40 (83)	0.365
Valve surgery	57 (12)	56 (14)	1 (2)	0.033
Congestive heart failure	38 (8)	32 (8)	6 (13)	0.367
Functional symptoms	13 (3)	12 (3)	1 (2)	0.949
Scheduling of cardiac rehabilitation (CR) – days				
Days between event and CR	14 (11-21)	14 (11-21)	19 (11-30)	0.040
Days between discharge and CR	9 (5-16)	8 (5-14)	14 (9-26)	<0.001
Days at hospital	5 (2-8)	6 (2-8)	2 (-6)	0.007
Left Ventricular Ejection Fraction - %				
Before CR	55 (48-60)	55 (48-60)	55 (45-63)	0.664
After CR	58 (50-60)	60 (50-60)	50 (40-55)	0.17
Ergometry Performance - % expected Watts				
Before CR	68 (56-83)	67 (55-82)	77 (64-93)	0.003
After CR	101 (7-113)	102 (89-114)	80 (72-99)	<0.001



Table 2 Univariable Predictors for Successful Response to Cardiac Rehabilitation

Variables	Odds Ratio	p-value
Age – yr	0.987	0.383
Male gender	0.600	0.206
Indication for cardiac rehabilitation		
Coronary artery disease (CAD)	0.624	0.243
Valvular Repair	7.393	0.049
Congestive heart failure	0.589	0.264
Functional symptoms	1.410	0.744
Scheduling of cardiac rehabilitation (CR)		
Days between event and CR	0.991	0.186
Days between discharge and CR	0.987	0.055
Days at hospital	1.050	0.157
Left Ventricular Ejection Fraction Before CR - %	1.002	0.934
Ergometry Performance before CR- % expected Watt	0.978	0.004

## Conclusion

Even though the vast majority of patients profit from cardiac rehabilitation, the prediction of good or poor response is difficult and limited. **Impaired physical performance before the rehabilitation** seems to be an **independent predictor** for good response to an ambulatory cardiac rehabilitation.