Coronary heart disease from a psychosocial perspective

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Chapter 7

Psychosocial predictors of change in quality of life among patients with coronary heart disease[5]

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[5] Submitted

Abstract

Purpose:

Health-related quality of life (HRQL) after coronary interventions (CABG, PTCA) usually improves among patients, but not among all patients. Some actually show a significant decline in HRQL. Our aim was to explore the potential of psychological well-being (anxiety, depression), vital exhaustion, Type-D personality and socioeconomic position as predictors of improvement in HRQL, and separately of lack of improvement in HRQL (i.e. stable or worse).

Methods:

106 patients scheduled for coronary angiography (CAG) were interviewed before CAG (baseline) and 12-24 months after. Socioeconomic status was evaluated by education. GHQ-28 was used for measuring psychological well-being (anxiety, depression), the Maastricht interview for vital exhaustion and the Type-D questionnaire for personality. HRQL was assessed using the SF-36 (physical and mental component) questionnaire. Functional status was assessed with a combination of NYHA and CCS. Linear regressions were used to analyze data.

Results:

A change in physical HRQL was predicted by baseline psychological well-being (β=-0.39;95%CI:-1.00,-0.16) and baseline HRQL (β=-0.61;95%CI:-0.83,-0.34). A change in the mental HRQL was predicted by (baseline) psychological well-being(β=-0.37;95%CI:-0.99,-0.09), vital exhaustion(β=-0.21;95%CI:-0.69,-0.03) and baseline HRQL(β=-0.76;95%CI:-1.03,-0.44). However, these factors were significant only among patients who improve in their HRQL.

Conclusion:

Psychological well-being and vital exhaustion are significant predictors of positive change in HRQL among coronary patients.

Introduction

Although the mortality caused by coronary heart disease in the most European countries decreased in the recent years, still CHD is the leading cause of morbidity and disability of the population. In the countries of the Eastern and Central Europe, CHD rates remain rather high among general population compared to west European countries (1, 2). However, when evaluated statistical decrease in mortality, it is needed to take into account also other possible influences on this trend, for instance epidemiological trends of incidence of myocardial infarction should be evaluated also from the aspect of statistical increase of small infractions caused by introduction

of troponin- based criterion into diagnostics, which might contribute to the false statistical decrease in mortality trends (3).

The focus of research on coronary heart disease is currently shifting toward quality of life among patients, and psychosocial factors are also becoming more important. This is partly due to the fact that medically oriented treatment strategies have strongly developed over the past decades, and survival rates among coronary patients has significantly improved. This has enabled many patients to live longer and better despite their disease. Quality of life has thus been increasingly considered as an important outcome measure in research focused on patients with coronary heart disease (4, 5).

A patient's quality of life is a complex, multidimensional construct comprising physical, mental, social and economic components and can be influenced by various factors, including both medical and psychosocial parameters (6). Due to the inconsistency in definition, it is often operationalised as perceived health status, self-rated health or health-related quality of life. In the present study we used as a measure of quality of life the SF-36 questionnaire, which attempts to capture the subjective (self-perceived) health status of patient as a reflection of his/her disease. The outcome parameter of the SF-36 is usually defined as health-related quality of life (HRQL) and can be used to evaluate the broad impact of a disease on a patient and the effectiveness of interventions aimed at mental and physical health (7, 8).

Recent research has shown HRQL to be a construct of high clinical relevance, with HRQL significantly predicting long-term mortality among patients with coronary heart disease (9) as well as short-term mortality after cardiac surgery, especially among older patients (10). Long-term mortality, re-admissions and cardiovascular events after invasive coronary procedures (CABG or PTCA) among patients with coronary heart disease and among patients with the heart failure have all been predicted by HRQL (11, 12, 13).

Invasive coronary procedures (coronary-artery bypass grafting – CABG, or percutaneous transluminal coronary angioplasty – PTCA) usually lead to an improvement in both the physical and mental dimensions of HRQL, but there is still a significant proportion of patients who do not improve, or who even show a decline in HRQL (14, 15, 16). Hawkes & Mortensen have concluded that predicting in advance which patients will benefit from therapy or intervention and which will not by investigating clinically significant intra-individual change standards in HRQL may therefore be a relevant step. Evidence regarding deterioration in HRQL is scarce, however, and most studies focused on predicting HRQL after invasive coronary procedure look at medical factors; thus, data on psychosocial factors as predictors of HRQL after surgery are lacking. From psychosocial factors, it might be expected that mood

disturbances (depression, anxiety) in particular play an important role, as a strong association between depression and coronary heart disease is well established based on numerous studies. Symptoms of depression not only increase the likelihood of CHD but also have independent adverse effects on later prognosis among patients who have already experienced a cardiac event (17, 18). Myocardial infarction (MI) is often followed by symptoms of depression and anxiety, and the presence of post-MI depression is associated with increased risk of mortality and morbidity. Patients with high levels of post-MI depression are more likely to die of cardiac causes over the subsequent years and have a higher probability of nonfatal re-infarction and other cardiac complications (19, 20, 21).

Our aim was to identify psychosocial predictors of change in the health-related quality of life among patients with coronary heart disease. The predictors of change in HRQL were also assessed separately for any lack of improvement in HRQL (i.e. patients with a stable or worse HRQL). We focused not only on the well-known characteristics traditionally associated with coronary heart disease, such as depression and anxiety (in our study represented by the term psychological well-being), but also on the less commonly explored factors of vital exhaustion, Type-D personality and socioeconomic status (education).

Methods

Study participants and procedunre

The study sample consisted of patients who had been referred for coronary angiography (CAG) by their cardiologist. Both the baseline and the subsequent measurements were performed in the East Slovakian Institute for Cardiac and Vascular Diseases in Kosice, where patients from the whole East Slovakian region (about 1.5 million inhabitants) are referred to for diagnosis and treatment. A total of 233 patients underwent a personal interview with a trained psychologist at baseline, and medical data were retrieved from their medical records. This part of the data collection was performed before the coronary angiography. A follow-up examination was performed 12 to 24 month after the CAG and/or subsequent treatment, since it might be expected that significant positive or negative changes in HRQL will be pronounced in a period of at least one year after the intervention. For the follow-up examination we invited only those patients who were indicated for the percutaneous transluminal coronary angioplasty (PTCA), coronary-artery bypass grafting (CABG) or for pharmaceutical treatment. This means that 57 participants with the normal coronary angiogram at the baseline were not enrolled in the follow-up. Thus, a total of 106 patients took a part in a follow-up examination (response rate 60.3%).

General inclusion criteria at baseline were as follows: coronary heart disease (CHD) in the medical history, age less than 75, no severe cognitive impairments and no history of severe psychiatric disorder. Patients with cardiovascular problems other than coronary heart disease (e.g. valve disease) and with serious co-morbidity were excluded. All participants were provided with information about the study and signed an informed consent letter. Ethical approval for this study was obtained from the Ethics Committee of the East Slovakian Institute for Cardiac and Vascular Diseases in Kosice.

Measures

Psychological well-being

To assess psychological well being, the GHQ 28 - General Health Questionnaire was used. It consists of 28 items divided into 4 subscales: physical symptoms, anxiety and insomnia, social dysfunction and depression (22). A total GHQ 28 score is between 0 and 84, with a higher score indicating worse mental health status (23). The psychometric properties of the Slovak version of this questionnaire have been shown to be acceptable (24). In the present study the Cronbach's alpha was 0.92.

Health-related quality of life (HRQL)

The SF-36 questionnaire (7,25) provides a subjective measure of eight dimensions of HRQL: bodily pain, physical functioning, physical role limitations, general health perceptions, vitality, emotional role limitations, mental health and social functioning. The first four subscales can be summarized into a physical functioning component summary and the last four into a mental functioning component summary. These latter two components were used as the outcome measures in this study. The summary score ranges from 0 to 100, with lower scores indicating worse HRQL. Cronbach's alpha for the physical component of SF-36 in our study was 0.88, and for the mental component of SF-36 it was 0.90.

Vital exhaustion

The structured Maastricht Interview for Vital Exhaustion, which consists of 23 questions, measures feelings of exhaustion, such as tiredness, lack of energy, irritability or disrupted sleep. Scores range from 0-46, with a cutoff point of 17 or higher identifying a participant as 'exhausted' (26). The scale has been found to have good psychometric properties (27). In the present study the Cronbach's alpha was 0.87.

Type-D personality

Type-D personality was measured with the 14-item Type-D Personality Scale (DS14) which consists of 2 subscales: negative affectivity, or NA (a tendency to experience negative emotions) and social inhibition, or SI (not expressing emotions in social interactions). A score of 10 or more on both subscales denotes a person with a Type-D personality (28). In the present study the Cronbach's alpha was 0.82.

Functional status

Functional status was assessed by a cardiologist based on 2 scales: NYHA – 4 classifications according to the New York Heart Association classification of dyspnea symptoms (29), and CCS – 4 classifications identifying the severity of chest pain according to the Canadian Cardiovascular Society (30). In both scales, a higher classification represents worse functional status. In this study we used the worst level from these two scales as the indicator of functional status.

Socioeconomic position

The socioeconomic position of participants was measured according to their level of education: basic education, middle education (lower secondary without school-leaving exams and secondary with the graduation exams) and high (university) education.

Analysis

We first analyzed the basic demographic, medical and psychological characteristics of patients according to the type of intervention indicated after the coronary angiography (CABG, PTCA/stent and pharmacotherapy), as well as the SF-36 scores at the baseline and the follow-up. Second, we used t-tests for repeated measurements to asses the statistical significance of changes in the physical and mental component of SF-36 between the baseline and the follow-up. The clinical relevance of the change in both components of the SF-36 was assessed using a distribution-based model [31]. We employed effect sizes and an SEM-based criterion (SEM – standard error of measurement). Effect sizes from 0 to 0.2 are considered trivial; those from 0.2 to 0.5 to be small; those from 0.5 to 0.8 to be moderate; and effect sizes of 0.8 or higher to be large [31]. Regarding the definition of the SEM-based criterion of the clinically relevant change, we employed 1.96 SEM as a reflection of the 95% confidence interval. We defined patients as improved in HRQL when their increase in SF-36 score was >1.96 SEM, patients who declined as having a decrease of >1.96 SEM, and those remaining stable as having a change in score of ≤1.96 SEM.

To determinate predictors for change in the physical and mental aspect of HRQL, multiple linear regression analyses were performed. Age, gender, functional status and the type of intervention were included in the regression models as possible confounding variables, and education, psychological well-being, vital exhaustion, Type-D personality and baseline HRQL as expected predictors. Linear regressions were performed first for the total sample. In the next step we also computed linear regression separately in the two groups: The 1st group consisted of patients who improved in HRQL, and the 2nd group was made up of patients who did not improve in HRQL, i.e. those who deteriorated or remained stable. Statistical analyses were performed using SPPS, version 14.0.

Results

The mean age of participants in our study was 57.4 years (SD= ±6.7), and 15.1% were women. Most of the patients had middle education (54.7%), while 25.5% of the participants had a basic education and 19.8% had a higher education. These characteristics were similar in all sub-groups according to the type of intervention. Basic psychological and medical characteristics within the research groups are presented in Table 1.

Table 1. Baseline characteristics of patients in study

Type of the intervention after CAG*		CABG*	PTCA/stent*	Pharmacotherapy	Total study sample
Total number	N (%)	41 (38.7%)	37 (34.9%)	28 (26.4%)	106 (100%)
Age	Mean (SD)	59.4 (±5.4)	55.8 (±7.6)	56.8 (±6.4)	57.4 (±6.7)
	Range	49-73	34-69	46-69	34-73
Gender	Males	35 (85.4%)	30 (81.1%)	25 (89.3%)	90 (84.9%)
	Females	6 (14.6%)	7 (18.9%)	3 (10.7%)	16 (15.1%)
Education	Basic	8 (19.5%)	7 (18.9%)	12 (42.9%)	27 (25.5%)
	Secondary	21 (51.2%)	23 (62.2%)	14 (50.0%)	58 (54.7%)
	High	12 (29.3%)	7 (18.9%)	2 (7.1%)	21 (19.8%)
Functional status	Class I	2 (4.8%)	5 (13.9%)	5 (17.9%)	12 (11.6%)
	Class II	15 (36.6%)	13 (36.1%)	11 (39.3%)	39 (37.9%)
	Class III	21 (51.2%)	16 (44.4%)	9 (32.1%)	46 (44.7%)
	Class IV	3 (7.3%)	12 (5.6%)	1 (3.6%)	6 (5.8%)
Psych. well being	Mean (SD)	27.7 (±9.9)	29.1 (±12.5)	25.4 (±13.2)	27.7 (±11.7)
Vital exhaustion	Mean (SD)	18.4 (±8.8)	20.7 (±9.6)	21.6 (±12.4)	20.1 (±10.1)
Type D	Type D	27 (34.1%)	20 (54.1%)	16 (57.1%)	63 (59.4%)
	Non-Type D	14 (65.9%)	17 (45.9%)	12 (42.9%)	43 (40.6%)

*** CAG**- coronary angiography, **CABG**- coronary-artery bypass grafting, **PTCA/stent**- percutaneous transluminal coronary angioplasty with or without stent

Table 2 shows the SF-36 summary scores (physical and mental component) at baseline and at the follow-up for the total sample and for each sub-group according to the type of the intervention after coronary angiography. For the physical component of the SF-36, statistically significant improvements were found among all groups of patients, except for patients indicated for pharmacotherapy, and in the mental component, significant improvements were found among all groups of patients (as indicated by p-values and effect sizes in the Table 2).

Testing for a clinically relevant change in HRQL by using the SEM-based criterion revealed that approximately 40% of patients improved in the physical component of the SF-36, one half of the participants (51%) remained stable, and almost 9% declined in this component of HRQL. Results in the mental component of the SF-36 were similar, with 36% of patients improved, more than half (56%) remaining stable, and 8% of participants showing a decline.

Table 2. Health related quality of life (SF- 36 scores) at the baseline and follow up

Physical component of the health related quality of life								
Type of intervention	**Baseline Mean (SD)**	**Follow-up Mean (SD)**	****Change Mean (SD)**	**p-value**	*****Effect size**	**Patients improved (%)**	**Patients stable (%)**	**Patients declined (%)**
All (106)	48.3 (±18.5)	57.2 (±17.8)	9.1 (±18.4)	0.001	-0.68	40.6%	51.0%	8.3 %
CABG* (41)	46.6 (±14.7)	59.1 (±16.2)	11.4 (±17.3)	0.001	-0.94	42.1 %	55.3 %	2.6 %
PTCA/stent* (37)	45.8 (±20.6)	57.7 (±23.4)	10.1 (±19.8)	0.008	-0.72	38.7 %	51.6 %	9.7 %
Pharmacotherapy (28)	50.6 (±21.2)	54.1 (±22.1)	4.5 (±17.9)	0.207	-0.35	40.7 %	44.4 %	14.8 %
Mental component of the health related quality of life								
Type of intervention	**Baseline Mean (SD)**	**Follow-up Mean (SD)**	****Change Mean (SD)**	**p-value**	*****Effect size**	**Patients improved (%)**	**Patients stable (%)**	**Patients declined (%)**
All (106)	58.5 (±17.8)	65.2 (±18.2)	7.7 (±16.5)	0.001	-0.55	35.8 %	52.6 %	11.6 %
CABG* (41)	58.9 (±17.3)	65.9 (±16.9)	8.1 (±17.1)	0.007	-0.67	35.1 %	54.1 %	10.8 %
PTCA/stent* (37)	56.6 (±18.5)	62.1 (±19.4)	6.6 (±17.1)	0.035	-0.55	36.4 %	48.5 %	15.2 %
Pharmacotherapy (28)	60.6 (±17.9)	68. 1 (±18.6)	8.6 (±15.2)	0.009	-0.79	36.0 %	56.0 %	8.0 %

*** CABG**- coronary-artery bypass grafting, **PTCA/stent**- percutaneous transluminal coronary angioplasty with or without stent

** change between baseline and follow-up

*** negative values for effect size between baseline and follow-up represents improvement in HRQL, positive values represents declining

The linear regression model showed that significant baseline predictors for a change in the physical HRQL were psychological well-being and the baseline physical component of SF-36. Significant predictors of change in the mental HRQL were psychological well-being, vital exhaustion and the baseline mental component of SF-36 (Table 3). Socioeconomic status and personality traits were not significant in predicting a change in HRQL among our patients.

Table 3. Baseline predictors for change in the health related quality of life (HRQL) among participants

	Physical component of HRQL		Mental component of HRQL	
	β- value	95% CI	β- value	95% CI
Age	-0.01	(-0.55 ; 0.50)	-0.01	(-0.49 ; 0.47)
Gender	0.14	(-2.57 ; 18.61)	0.13	(-3.29 ; 15.58)
Functional status	0.05	(-3.49 ; 5.53)	0.05	(-3.20 ; 4.85)
Intervention	0.04	(-3.79 ; 5.36)	-0.07	(-5.74 ; 2.80)
Education	0.13	(-2.58 ; 9.51)	0.05	(-4.07 ; 6.69)
Psychol. well-being	-0.34**	(-1.01 ; -0.16)**	-0.36*	(-0.98 ; -0.077)*
Vital exhaustion	-0.13	(-0.63 ; 0.17)	-0.22*	(-0.71 ; 0.016)*
Type D	0.13	(-2.47 ; 12.08)	0.03	(-5.89 ; 7.87)
Baseline HRQL	-0.60***	(-0.83 ; -0.33)***	-0.76**	(-1.03 ; -0.44)**
Total R^2 (adjusted)	0.24		0.21	

* p<0.05, ** p<0.01, *** p<0.001, Statistical significant results are in bold

When linear regression was performed separately within the groups of patients who improved and those who did not improve in HRQL, the results showed that psychological well-being was a significant predictor only among those who improved (in both the mental and physical components of HRQL). Within the group of participants who did not improve in HRQL, only baseline HRQL was significantly associated with the physical component of the SF-36 (Table 4)

Table 4. Baseline predictors for change in the health related quality of life (HRQL) among patients who improved, and who did not improve.

		Physical component of HRQL		Mental component of HRQL	
		β- value	95% CI	β- value	95% CI
Improved in HRQL	Age	-0.28	(-1.21 ; 0.16)	0.14	(-0.39 ; 0.74)
	Gender	0.10	(-6.09 ; 14.15)	0.08	(-8.54 ; 11.90)
	Functional status	0.37*	(-0.17 ; 10.01*)	-0.16	(-5.98 ; 3.19)
	Intervention	0.01	(-5.31 ; 5.35)	0.17	(-3.64 ; 7.54)
	Education	0.07	(-5.71 ; 8.18)	-0.17	(-8.36 ; 3.36)
	Psychol. well-being	-0.44*	(-1.05 ; 0.03*)	-0.66*	(-1.16 ; -0.11*)
	Vital exhaustion	0.01	(-0.51 ; 0.52)	-0.01	(-0.45 ; 0.43)
	Type D	0.18	(-4.40 ; 12.79)	-0.11	(-9.59 ; 5.36)
	Baseline HRQL	-0.34	(-0.60 ; 0.08)	-0.91**	(-0.87 ; -0.17**)
	Total R^2 (adjusted)		0.17		0.15
Not improved in HRQL	Age	0.07	(-0.38 ; 0.60)	0.61	(-0.20 ; 0.68)
	Gender	-0.09	(-19.90 ; 10.42)	-0.05	(-13.35 ; 9.16)
	Functional status	-0.08	(-5.45 ; 3.43)	0.04	(-3.38 ; 4.36)
	Intervention	0.10	(-3.05 ; 5.80)	-0.12	(-5.21 ; 2.18)
	Education	0.24	(-1.81 ; 10.49)	0.06	(-4.10 ; 5.96)
	Psychol. well-being	-0.21	(-0.64 ; 0.25)	0.11	(-0.35 ; 0.54)
	Vital exhaustion	-0.20	(-0.59 ; 0.15)	-0.17	(-0.47 ; 0.15)
	Type D	0.21	(-2.48 ; 12.28)	0.07	(-4.85 ; 7.77)
	Baseline HRQL	-0.48*	(-0.58 ; -0.02*)	-0.27	(-0.49 ; 0.16)
	Total R^2 (adjusted)		0.02		-0.03

Discussion

Major findings

Psychological well-being (depression and anxiety), vital exhaustion (only for the mental component) and the baseline HRQL were identified as significant baseline predictors for a change in HRQL. Only a few previous studies exploring predictors of HRQL have focused on psychosocial variables as potential predictors. Symptoms of depression and anxiety have been found to predict short-term HRQL (3 months after treatment) in a study by Höfer et al. (5) and to be associated with the HRQL among coronary patients in one cross-sectional study (32). Our results showed that psychological well-being (depression and anxiety) significantly predicts both the mental and physical components of HRQL also over a long-term period (12-24 month after treatment), and that not only are depression and anxiety of importance in predicting HRQL, but that vital exhaustion is too.

However, it is necessary to take into account that the psychosocial factors mentioned were predicting HRQL only among patients who improved in their quality of life. Approximately one half of patients remained stable with regard to both mental and physical component of HRQL (they neither improved nor deteriorated) in the follow-up examination after coronary angiography and/or subsequent treatment. It would be of use to focus on exploring other possible predictors of HRQL in this group of patients, as it seems that different pathway mechanisms apply among patients who improved and those who deteriorated in their HRQL

Our study showed that psychological characteristics were even more significant than functional status or type of treatment after CAG (indicating the seriousness of the disease) in predicting HRQL among patients with coronary heart disease. It has also been shown, that psychosocial characteristics expressing mental health (anxiety, depression, vital exhaustion) were more important in predicting HRQL than more stable personality traits (hostility, Type-D personality), which might be of importance in planning psychologically oriented intervention strategies focusing on improving quality of life among coronary patients.

Socioeconomic differences in the prognosis of coronary heart disease have been found in numerous studies showing that socioeconomic disadvantage is associated with higher mortality and higher incidence of cardiac complications (33, 34, 35); thus it could be expected that similar effect would be present in HRQL. However, results of the present study suggest that a change in the health-related quality of life was not significantly predicted by socioeconomic status (as measured by education). It might be probable that socioeconomic status influences quality of life indirectly, via psychological factors. Thus, SES have an effect on depression and anxiety which consequently influences quality of life. It is also possible that current socioeconomic status has an impact only on current HRQL, but that it does not predict HRQL in the future (after treatment, respectively).

Strengths and limitations

The longitudinal design of the present study and the focus on the psychosocial predictors of the HRQL allowed us to contribute to this important but less explored field in coronary heart disease research. However, the relatively small number of participants is one limitation of the present study which should be mentioned. As a result, we did not identify a sufficient number of patients who declined in their HRQL, and it was therefore not possible to explore psychosocial predictors specifically in patients who deteriorated in HRQL separately, but only among the group which did not improve, meaning those who remained stable or declined.

Conclusions and implications for research and practice

It would be useful to direct future research efforts on indentifying predictors of HRQL also separately among patients who declined in HRQL, as different predictors may occur as significant in this group.

In the present study, psychosocial factors, especially psychological well-being and vital exhaustion, were shown to be predictors of a positive change in health-related quality of life among coronary patients.

Improving the psychological well-being of patients would have a significant beneficial effect on their quality of life. More focus on managing problems with depression in particular is needed among patients with coronary heart patients, as psychosocial factors significantly influence the quality of life among coronary patients.

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