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## Quality of life and ethics-patients with ischemic heart disease

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2005

[Link to publication](#)

*Citation for published version (APA):*

Westin, L. (2005). *Quality of life and ethics-patients with ischemic heart disease*. [Doctoral Thesis (compilation), Medical Ethics]. Department of Medical Ethics, Lund University.

*Total number of authors:*

1

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ORIGINAL ARTICLE

## Patients with ischemic heart disease: Quality of life predicts long-term mortality

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### Abstract

**Objective.** We have investigated whether perceived quality of life has an impact on long-term survival after a cardiac event. **Design.** Male ( $n=316$ ) and female ( $n=97$ ) patients were assessed by means of a self-administered quality of life questionnaire 1 year after either acute myocardial infarction ( $n=296$ ), coronary artery bypass grafting surgery ( $n=99$ ) or percutaneous coronary intervention ( $n=18$ ). Inclusion period was 1989–1991. Ten years after the last patient answered the 1-year questionnaire, mortality (status factor) up to census date was analysed using nine dimensions of quality of life as covariates (Cox regression). **Results.** At 1-year assessment, subjective general health (RR = 3.15), perceived arrhythmia (RR = 1.72), experience of sex life (RR = 1.55), perceived breathlessness (RR = 1.50) and experience of self-esteem (RR = 1.48) were all significantly related to death within the period up to census date. **Conclusion.** The findings highlight that the patients' own experience of his or her quality of life, has a prognostic importance for long-term mortality after a cardiac event. Clinicians should be aware that a careful monitoring of perceived quality of life is an important part of good patient care.

**Key words:** Ischemic heart disease, long-term follow-up, mortality, quality of life, questionnaire

### Introduction

Ischemic heart disease (IHD) is the leading cause of death in the world (1). This is also the case for Sweden, where IHD is the prime cause of death among both men and women (2). As science adds life to years, and not just years to life, quality of life (QL) gained becomes very important but unfortunately also one of the most difficult issues in the clinical setting. The World Health Organization has defined QL as:

An individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectation, standards and concerns. It is a broad ranging concept incorporating in a complex way the person's physical health, psychological state, level of independence, social relationships, personal beliefs and their relationship to salient features of the environment. (3)

Similarly, we defined QL as a composite construct consisting of various aspects of somatic health, mental health, self-esteem, degree of optimism/pessimism, ability to perform and enjoy everyday activities at work and home as well as sexual relationships (4).

During recent years, several studies have shown that the patients' self-reported QL may predict mortality or other adverse outcomes in patients with IHD (5–7). These studies have a relatively short follow-up time. A long-term follow-up would therefore be of interest.

The aim of the present study is to investigate whether somatic and psychological dimensions of QL predict patient mortality in IHD during a period of about 10 years after the index event. We have used three types of index events: acute myocardial infarction (AMI), coronary artery bypass grafting surgery (CABG) and percutaneous coronary intervention (PCI).

## Methods

A total of 413 patients (316 males and 97 females) were included in a follow-up investigation of patients with IHD carried out in Malmö, southern Sweden. Patients were included consecutively between October 1989 and April 1991. The AMI patients included were hospitalized at the Coronary Care Unit, University Hospital, Malmö, and CABG and PCI patients from the nearby University Hospital in Lund (4,8).

Patients had to be residents of Malmö discharged to their homes after hospital stay. All patients under the age of 70 were included during the first year of the study, while only those between 50 and 70 years of age were included during the rest of the inclusion time. Diagnosis of AMI was based on standard criteria of typical chest pain, ECG changes and elevation of cardio-specific enzymes. Allocation to a category (AMI, CABG or PCI) was based upon the initial cardiac event and remained constant even if an intervention was subsequently performed during the period of follow-up. At baseline, during the first 24 h of the initial hospitalization (the index event), risk factors for cardiac disease as well as other standard laboratory tests were determined. Four weeks later an exercise ECG was performed, limited by symptoms and ECG changes. One year after the index event a QL questionnaire was administered to all patients at a concluding visit regardless of the type of follow-up or if any intervention had taken place. As the aspect studied in this paper is long-term mortality, a census date (May 2002) was determined when alive/dead status was noted for the entire study population. This census date was not included in the initial study programme.

### Study population

Among the patients who fulfilled the formal inclusion criteria ( $n=453$ ), 30 AMI patients did not participate in the study for the following reasons: 8 had severe non-cardiac diseases (e.g. stroke with hemiparesis, cancer with metastasis), 3 had serious abuse problems, 2 were not Swedish speaking, 11 did not want to participate in this follow-up because of ongoing contact with other physicians and 6 refrained for unknown reasons. Among CABG patients nine had contact with other physicians and one was not Swedish speaking. All PCI patients eligible for the study participated. Among the 40 non-participating patients the mean age was 60.4 years and 74% were males. This was similar to the participating patients: 60.2 years and 77% males, respectively (4,8).

At the 1-year assessment 349 patients completed the questionnaire.

### QL assessments

In order to measure QL, a multifaceted questionnaire was constructed, consisting partly of existing instruments and partly of new sections where, to our knowledge, no relevant instruments were available. The patients were given this self-administered questionnaire designed for assessment of QL by a nurse during a visit to the hospital. They were told to complete the questionnaire at home. It was returned by mail or at the next hospital visit.

Questionnaire items were grouped into nine QL dimensions (Table I). Description and sources of items as well as reliability and internal consistency assessments of the questionnaire dimensions have been done by the first author and published previously (4). Questionnaire items were almost exclusively of Likert scale type with the number 1 representing absence and the number 4 representing the greatest degree of problematic state. Patients were asked to choose the alternative that best described their situation during the past week. A score was derived for a given group of items forming the dimension by adding the scores for that group of items and dividing this sum by the number of items answered by the respondent. Thus, a higher score meant poorer QL in that dimension.

### Statistics

Two-tailed *t*-test was used for comparisons of age, two-tailed Mann-Whitney Wilcoxon Rank Sum test for comparisons of baseline risk factors like blood pressure and lipids, and Fisher's exact test or  $\chi^2$ -test for comparisons of nominal data. Cox regression was used for survival analysis, utilizing follow-up time until death or in case of surviving patients, the time

Table I. Dimensions of quality of life (QL) 1 year after cardiac event (1989–1991) with risk ratios and confidence intervals (CI) for death until the time of census (2002) – Cox regression with correction for sex and age is used for the analysis ( $n=349$ ).

Dimension of QL	Risk ratio	95% CI for risk ratio	<i>p</i> -value
Subjective general health	3.15	1.88–5.25	<0.001
Perceived arrhythmia	1.72	1.11–2.66	0.01
Experience of sex life	1.55	1.20–1.99	<0.001
Perceived breathlessness	1.50	1.12–2.03	0.007
Experience of self-esteem	1.48	1.12–1.96	0.006
Experience of depression	1.44	1.02–2.04	0.04
Experience of anxiety	1.21	0.86–1.69	0.27
Perceived chest pain	1.13	0.73–1.75	0.58
Experience of social life	0.97	0.58–1.63	0.92

from inclusion until 1 May 2002 as the time factor. Whether the patient was alive or dead was used as status factor and the various dimensions of QL as covariates. Results for the dimensions of QL were corrected for age and sex. Statistical significance was accepted at  $p \leq 0.01$ . SPSS (6.0–11.0 for Windows) was used for statistical analysis (9).

## Results

Between inclusion and census 139 patients died (4). Of the 413 patients initially included, 38 patients either died or were unable to complete the questionnaire because of serious diseases. Some of them had moved. Of the 375 who could answer, 349 (93%) completed the questionnaire. Mean time from the index event until date of census was 11.8 years (SD 0.5 years). For the patients who died the mean time from index event until death was 5.5 years (SD 3.5 years).

In the Cox regression analysis, age at inclusion was significantly related to death (mean age at inclusion for patients who died 63 years, survivors 59;  $p < 0.001$ ). Total patient group by type of event, sex and dead/alive status at census is shown in Table II.

In total, 341 (83%) patients were living with a partner and 72 (17%) without. Of the patients who died, 24% were living without a partner. Thus, the risk for death was significantly higher among those who lived without a partner ( $p < 0.01$ , Fisher's exact test).

The answers to the question: "Are you a smoker today?" with only "yes" and "no" as alternatives at 1-year was analysed. Answering "yes" gave a risk factor 1.82 for death during the period until census (95% CI 1.16–2.87;  $p < 0.01$ ).

When patients who died and survivors were compared at onset of the study no statistically significant differences in systolic and diastolic blood pressure, body mass index, serum cholesterol, high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol and serum triglycer-

ides were found. In contrast, blood glucose was higher among non-survivors than survivors (mean values 5.98 mmol/l, SD 2.4 and 7.0 mmol/l, SD 3.2, respectively,  $p = 0.001$ ).

When AMI patients who survived until census were compared to those who did not, there was no difference in the proportions of Q wave/non-Q wave infarctions. Nor differed the maximal levels of cardio-specific enzymes or proportions of patients receiving fibrinolysis. Cardiac decompensation during the hospital stay in connection with the index event was more common among AMI patients who subsequently died ( $p = 0.04$ , Fisher's exact test). When compared with respect to medication of beta-blocking agents, calcium channel antagonists, long acting nitrates or lipid lowering drugs at the first hospital visit after the index event, patients who died and those who survived did not differ. However, AMI patients who died were significantly more often on diuretics (of 95 patients on diuretics, 57 died,  $p < 0.001$ , Fisher's exact test).

The patients' assessment of subjective general health, perceived arrhythmia, experience of sex life, perceived breathlessness and experience of self-esteem at 1 year was statistically related to death. The other dimensions of QL did not reach significance at the 1-year assessment (Table I).

## Discussion

Whereas previous studies (5–7,10) have investigated the predictive value of self-reported QL for short-term mortality, this study demonstrates that IHD patients' self-reported QL also is a predictor for long-term mortality. The most important and by far the "hardest" endpoint in studies of diseases is the dichotomy of life and death (11).

In studies of QL in IHD patients, mortality rates have been shown to correlate with emotional state such as depression (12). In the present investigation we studied mortality during a period of more than 10 years after a cardiac event in relation to factors expressing QL. At the 1-year assessment, experience of general health, arrhythmia, sex life, breathlessness and self-esteem are related to death in this study.

Results from other investigators studying the impact of QL on mortality in cardiac patients are somewhat contradictory. Lespérance and co-workers (13,14) reported that depression following myocardial infarction was associated with a three- to four-fold risk of cardiac mortality, while Mayou et al. (15) found that depression and anxiety could predict poor outcome 1 year after a myocardial infarction but not mortality. Lane et al. (16) also studied depression and anxiety after myocardial infarction. These

Table II. Total patient group, by type of event (1989–1991), sex and alive/death status at census (2002).

Sex		Event			Total
		AMI	CABG	PCI	
Males ( $n = 316$ )	Dead	85	17	4	106
	Alive	141	61	8	210
Females ( $n = 97$ )	Dead	28	4	1	33
	Alive	42	17	5	64
Total		296	99	18	413

AMI=acute myocardial infarction; CABG=coronary artery bypass grafting; PCI=percutaneous coronary intervention.

investigators found that symptoms of depression and anxiety were not related to mortality whereas severity of infarction and evidence of heart failure predicted both cardiac and all-cause mortality. Subjectively perceived health has been shown by Tibblin et al. (17) to be related to cardiovascular disease and mortality in a population study. A recent study by Burström & Fredlund (18) found self-rated health to predict mortality.

A short time after cardiac event breathlessness and chest pain may be the most acute experiences for a patient suffering from IHD. However, in the long run subjective general health, experience of sex life and estimation of self-esteem may act as a common pathway for experience of sickness (cf. (19)). This possibly reflects the feeling of living with the threat of a possible mortal disease. The relation between diabetes mellitus and the prognosis of IHD is becoming increasingly clear, and this study supports the notion that an elevated level of blood glucose is strongly related to death after cardiac event. Other risk factors, like blood pressure and cholesterol levels, did not differ at baseline between those who survived and those who died before census. However, the treatment received by these two groups of patients may have differed considerably.

One limitation in this study is that we did not correlate QL to measures of cardiac function such as ejection fraction. Thus further studies in this field are needed. The advantage is that the patients' own assessment is used as a basis for analysis.

Although we have set a high level for accepting a predictive relation between personal experience and a future lethal outcome as significant ( $p \leq 0.01$ ), such relations do exist. Interestingly we found both generic and more cardio-specific parts of the questionnaire prognostic for mortality, thus we conclude that a rather wide range of items should be used when interviewing the patient (20,21). Further study may well show that other dimensions of QL also are related to death or other endpoints. The clinicians treating the patients are thus encouraged to carefully evaluate symptoms that are not regarded as primary cardiac symptoms since the non-cardiac sensations may be related to a disease process affecting both body and mind.

However, the question of whether a diminished QL reflects a disease process or vice versa is not addressed in this study. But it clearly demonstrates that the patients' perceived QL in the various dimensions could be used to predict the long-term outcome; not only morbidity, but also mortality.

## Acknowledgements

The great work performed by Elisabeth Hansson RN and Carin Alm RN in patient care and record keeping is gratefully acknowledged. Statistician Jan-Åke Nilsson BS provided valuable statistical guidance. This study was supported by grants from the Ernhold Lundström Foundation, the Swedish National Association against Heart and Chest Diseases and Malmö General Hospital research funds.

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