

Impact of post-hospital cardiac rehabilitation on the quality of life of patients after surgical treatment for coronary artery disease



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Abstract

Introduction: The quality of life of cardiovascular patients is worse than that of healthy individuals. Pain, dyspnea, and fatigue impair daily activities, which in turn leads to decreased life satisfaction and emotional deterioration. The objective of comprehensive treatment, including early rehabilitation, is to reduce the risk of complications, progression, and recurrence of the disease, as well as to restore, maintain, or improve all aspects of the patient's quality of life to the greatest extent possible.

Aim: To assess the quality of life of patients who underwent surgical treatment for coronary artery disease and completed the second phase of cardiac rehabilitation.

Material and methods: The study enrolled 100 patients undergoing early cardiac rehabilitation in stationary conditions after coronary artery bypass grafting. The group included 21 women and 79 men; their age ranged from 40 to 75 years. The study employed a questionnaire of our own design.

Results: Post-hospital cardiac rehabilitation resulted in quality of life improvements, especially with regard to psychological aspects, reducing the occurrence of anxiety from 44% to 21%. In addition, the rehabilitation program reduced the occurrence of subjective ailments such as chest pain (from 68% to 10%), fatigue (from 40% to 33%), and dyspnea (from 50% to 12%).

Conclusions: Despite the achievement of quality of life improvements among patients after surgery coronary artery bypass grafting and early cardiac rehabilitation, the result is not fully satisfactory. Systematic treatment and education should be continued to further improve the health of patients.

Key words: cardiac rehabilitation, quality of life, vascular bypass.

Streszczenie

Wstęp: Jakość życia pacjentów z chorobami układu krążenia jest gorsza w porównaniu z osobami zdrowymi. Ból, duszność, poczucie zmęczenia upośledzają wykonywanie codziennych czynności. Prowadzi to do obniżenia zadowolenia z życia i pogorszenia stanu emocjonalnego tych chorych. Celem kompleksowego leczenia, w tym wczesnej rehabilitacji, jest zmniejszenie ryzyka rozwoju powikłań, progresji i nawrotów choroby oraz jeśli jest to możliwe, przywrócenie, podtrzymanie lub poprawa jakości ich życia we wszystkich jego sferach.

Cel: Ocena jakości życia chorych poddanych operacyjnemu leczeniu choroby wieńcowej po zakończeniu drugiego etapu rehabilitacji kardiologicznej.

Materiał i metody: Do badań zakwalifikowano 100 chorych objętych procesem wczesnej rehabilitacji kardiologicznej w warunkach stacjonarnych po zabiegu pomostowania aortalno-wieńcowego. Wśród nich było 21 kobiet i 79 mężczyzn w wieku od 40 do 75 lat. W badaniach posłużono się autorskim kwestionariuszem ankiety.

Wyniki: Poszpitalna rehabilitacja kardiologiczna wpłynęła na poprawę jakości życia chorych, zwłaszcza w sferze psychicznej, zmniejszając występowanie lęku (z 44% do 21%). Ponadto zmniejszyło się odczuwanie subiektywnych dolegliwości, takich jak ból w klatce piersiowej (z 68% do 10%), męczliwość (z 40% do 33%) i duszność (z 50% do 12%).

Wnioski: Wczesna rehabilitacja kardiologiczna przyczyniła się do poprawy jakości życia chorych po operacyjnym leczeniu choroby wieńcowej (*by-pass*). Pomimo poprawy jakości życia chorych w wyniku leczenia i przeprowadzonej wczesnej rehabilitacji kardiologicznej jej wynik nie jest w pełni zadowalający. Należy kontynuować proces leczniczy i edukację chorych w sposób ciągły i systematyczny w celu dalszej poprawy stanu ich zdrowia.

Słowa kluczowe: rehabilitacja kardiologiczna, jakość życia, pomostowanie naczyniowe.

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Introduction

Quality of life (QoL) is a broad term which encompasses: physical condition including motor fitness, mental condition – satisfaction from life, socio-economic status, and somatic experiences [1–3]. According to the World Health Organization (WHO), good quality of life entails the ability to function normally and experience satisfaction from performing daily activities; it includes physical fitness, independence, sufficient energy for self-care, emotional stability, absence of pain or discomfort, as well as adequate sleep and rest [4].

Medically, QoL encompasses the patient's health status, diseases, and aging processes, as well as the influence of these factors on the patient's functioning.

Cardiovascular diseases and their complications are the most frequent cause of death in Poland and around the world, surpassing even neoplasms in this respect [5]. World Health Organization estimates that the number of deaths due to ischemic heart disease will rise from 7.1 million in 2002 to 11.1 million in 2020 [6].

The treatment of coronary artery disease depends on its presentation and symptom intensity. The primary goals of treatment are to improve prognosis, reduce the risk of acute coronary syndromes, and improve the QoL of affected patients. These goals can be realized by eliminating risk factors, changing the patient's lifestyle, providing pharmacological treatment, or, when necessary, performing myocardial revascularization. Invasive treatment includes percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG) [6]. The procedures aim to reduce myocardial ischemia and limit its unfavorable clinical symptoms. Indications for revascularization include symptoms persisting despite pharmacological treatment and/or a desire to improve prognosis [7]. The choice of the revascularization method depends on the patient's condition; both the potential benefits and the risks associated with the procedure should be considered. Coronary artery bypass grafting offers the greatest benefits to patients with advanced coronary artery disease and significant anginal complaints. The procedure enables quick improvement of both health status and quality of life, but it should be noted that it is more invasive and strenuous for the patients. An important role in preventing postoperative complications and ensuring quick recovery is played by cardiac rehabilitation, which should be started as soon as possible. The aim of cardiac rehabilitation conducted as part of secondary prevention is to improve the patient's quality of life in all its dimensions [8].

Quality of life measurement is used increasingly often as a criterion for treatment outcome evaluation in cardiology [9].

There are numerous scientific reports indicating that all QoL aspects improve after CABG, regardless of sex; however, the results remains ambiguous as some patients report no QoL improvement or even its deterioration after the treatment, which means that they experience no health status improvement [10]. Despite the surgical treatment, the level

of anxiety and depression of some patients remains high after CABG. The factors most often reported as responsible for this state of affairs include: the course of the recovery process, recurrence of cardiovascular events, time from the procedure, and reduced quality of life [11]. Most publications evaluate QoL after at least several months from the treatment. In turn, our study evaluated quality of life during the early postoperative period. We investigated whether the QoL of patients improved despite the short period of time that had passed from the surgery and early cardiac rehabilitation.

Aim

The aim of the study was to evaluate the quality of life of patients who had undergone surgical treatment for coronary artery disease and completed the 2nd stage of cardiac rehabilitation.

Material and methods

The study included all consecutive patients who had undergone surgical treatment for coronary artery disease (CABG) and had completed the stage of stationary post-hospital rehabilitation conducted at a cardiac spa hospital; all subjects provided their consent to participate in the study. A validated questionnaire of our own design was used; the questionnaire is presented at the end of this paper. It included questions concerning risk factors, lifestyle, physical activity, and subjective ailments. The questionnaire was distributed twice: on the first and the last day of the rehabilitation cycle. The exclusion criteria included lack of consent or poor health status precluding participation. The data were gathered in a database and analyzed.

Statistical analysis

Statistical analysis was performed using Statistica 8.0 software. Descriptive statistics were used to present general characteristics of the study group. Relations between the parameters were evaluated using a χ^2 test.

Results

The number of questionnaires distributed was 116. After the forms that were filled out incorrectly were eliminated, the final analysis encompassed questionnaires from 100 patients. The study included 21 women and 79 men; their age ranged from 40 to 79 years (58.42 ± 12.71).

Study group characteristics including demographic data are presented in Table I.

A decided majority of the subjects were men. Patients between 50 and 70 years of age constituted the largest age group.

The CABG treatment was performed as elective procedures in 30% of patients; the procedures were semi-elective in 26% of cases and urgent in as many as 44% of patients.

The study group characteristics concerning concomitant diseases are presented in Figure 1.

The most frequent concomitant condition was arterial hypertension.

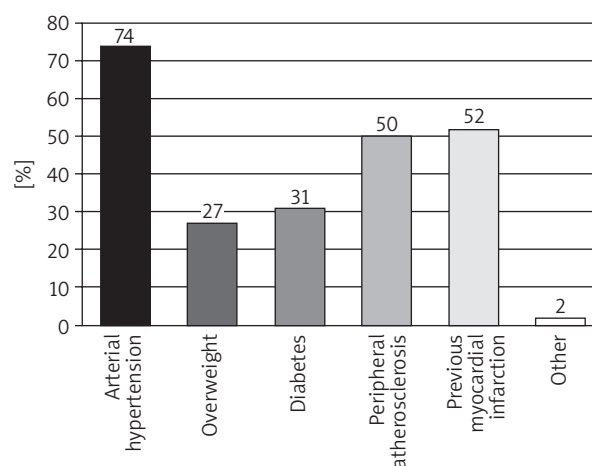
Tab. I. Study group characteristics – demographic data (n = 100)

Variable		Group size	
		n	%
Sex	Women	21	21
	Men	79	79
Age [years]	Up to 40	2	2
	41–50	5	5
	51–60	32	32
	61–70	39	39
	More than 70	22	22
Place of residence	Urban	60	60
	Rural	40	40
Education	Primary	19	19
	Vocational	33	33
	Secondary	32	32
	Higher	16	16

Tab. II. Study group characteristics – preoperative and postoperative physical activity

Physical activity		Before the procedure		After the procedure	
		n	%	n	%
Free-time activities	Watching TV, reading books, napping	58	58	32	32
	Walking, movement, recreation	18	18	68	68
	Household chores, gardening	24	24	0	0
Timed devoted to physical activity	Everyday	18	18	49	49
	3–4 times per week	12	12	25	25
	Once per week	14	14	6	6
	Twice per month	5	5	2	2
	Once per month	9	9	1	1
	Not active	42	42	17	17
Limitations in daily activities	No limitations	34	34	16	16
	Slight limitations	27	27	42	42
	Significant limitations	14	14	26	26
	Ailments precluding any activity	25	25	16	16
Difficult activities	Dressing, using the bathroom	8	8	18	18
	Using stairs	51	51	46	46
	Household chores	28	28	22	22
	Recreation	26	26	19	19

All patients included in the study received treatment for coronary artery disease (coronary artery bypass grafting). Moreover, all studied patients received recommendations concerning pharmacological treatment of the coronary artery disease as well as the specific concomitant condi-

**Fig. 1.** Study group characteristics – concomitant diseases

tion based on the current standards. All patients were advised to take: acetylsalicylic acid, statin, a β -blocker, and an angiotensin-converting-enzyme inhibitor. All patients also received recommendations regarding their diet and were advised to limit the consumption of animal fats as well as salt (patients with arterial hypertension) and calories (overweight patients); diabetic patients were advised to follow a diabetes diet plan.

The physical activity of the study group before and after the surgery is presented in Table II.

The proportion of patients participating in physical activity after the surgery was observed to increase. After the surgery and rehabilitation, the patients experienced fewer difficulties with everyday activities than before the surgery.

The study group characteristics regarding the subjective experience of ailments associated with the disease are presented in Table III.

After the procedure and the rehabilitation process, the patients were more likely to evaluate their health status as good; however, half of the study group experienced pain in the sternal area, associated with the postoperative wound.

The study group characteristics regarding subjective mental experiences accompanying the disease are presented in Figure 2.

The study group characteristics concerning the physical and mental changes following the surgical treatment for coronary artery disease and early rehabilitation are presented in Figure 3.

The physical and mental changes after early rehabilitation were evaluated. Half of the studied patients reported improved well-being and physical condition; in turn, a third of the study group was not able to specify whether the changes were favorable, which may have stemmed from the short period that had passed from the surgical procedure. Correlation analysis demonstrated a statistically significant impact of the rehabilitation on the QoL of the studied patients ($p < 0.01$, $df = 9$, $\chi^2 = 21.305$). The influence of age on the treatment outcome was not significant ($p > 0.702$, $df = 12$, $\chi^2 = 9.006$); in turn, significantly better QoL improvement was observed among women in comparison to

Tab. III. Study group characteristics – subjective ailments associated with the disease

Subjective ailments		Before the procedure		After the procedure	
		n	%	n	%
Health status perception	Good	25	25	34	34
	Unsatisfactory	46	46	16	16
	Difficult to define	29	29	50	50
Complaints	Chest pain	68	68	10	10
	Fatigability	40	40	33	33
	Dyspnea	50	50	12	12
	Sternal pain	0	0	53	53
	No complaints	14	14	23	23
Coronary pain occurrence	Heavy exertion	15	15	14	14
	Fast walking, after 200 m, after climbing the 2 nd floor	15	15	12	12
	Everyday activities, less than 200 m, before reaching the 2 nd floor	20	20	13	13
	During rest	31	31	2	2
	No coronary pain	19	19	59	59

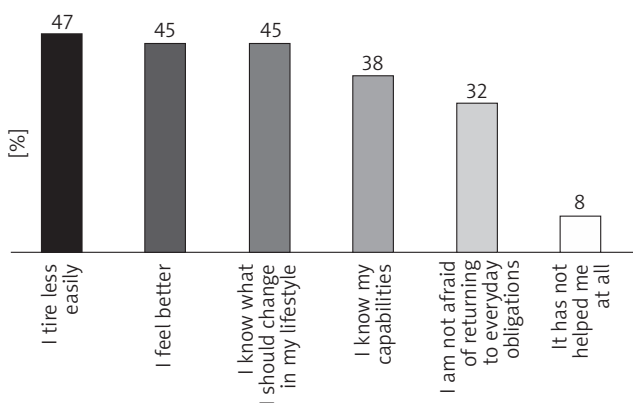


Fig. 4. Study group characteristics – activities influenced by the surgical treatment for coronary artery disease and early rehabilitation

men ($p < 0.05$, $df = 3$, $\chi^2 = 7.759$). In the study group, 64% of patients reported satisfaction from the treatment and rehabilitation, and 66% of patients stated that the early rehabilitation significantly contributed to their quicker recovery.

The study group characteristics concerning the activities influenced by rehabilitation are presented in Figure 4.

The study group characteristics concerning the quality of life after the surgical treatment for coronary artery disease and the completion of the early cardiac rehabilitation process are presented in Figure 5.

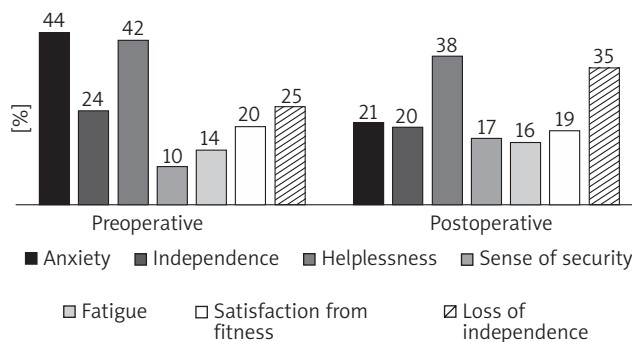


Fig. 2. Study group characteristics – subjective mental experiences accompanying the disease

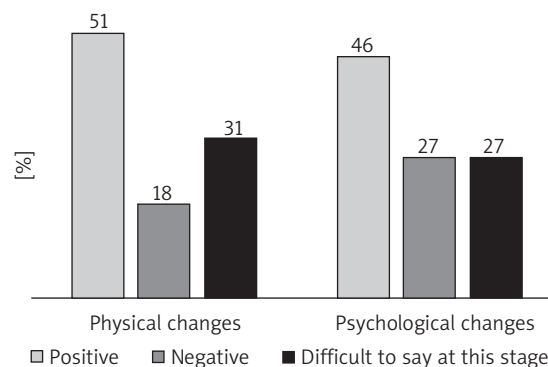


Fig. 3. Study group characteristics – physical and mental changes following the surgical treatment for coronary artery disease and early rehabilitation

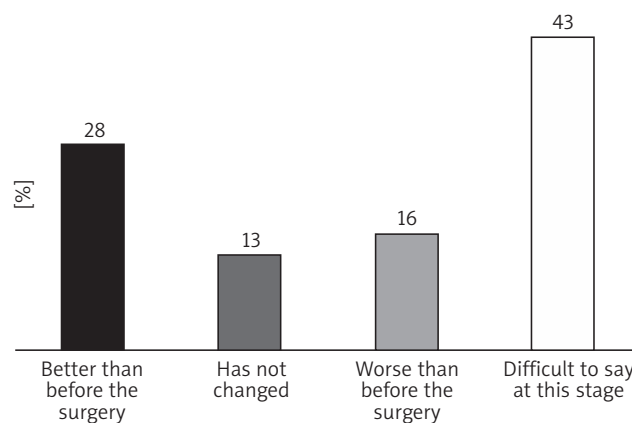


Fig. 5. Study group characteristics – quality of life of patients after surgical treatment for coronary artery disease and early rehabilitation

Discussion

Coronary artery disease is a common condition of the circulatory system; during its course, it adversely affects all aspects of functioning. Study results indicate significantly lower QoL values in patients with coronary artery disease compared to healthy individuals [12]. Factors such as age, concomitant disorders, presence of risk factors, level of knowledge, and lifestyle influence the course of the disease and its treatment as well as the quality of life of the affected patients.

A study by Shan *et al.* demonstrated that the age of patients undergoing coronary artery bypass grafting is increasing [13]. Aging processes increase the risk of chronic diseases and can influence quality of life, but this relation has not been fully explained. It has been demonstrated that the presence of concomitant diseases in elderly individuals is associated with longer hospitalization and higher rates of mortality and complications. Most patients analyzed in this study were over the age of 60. This may stem from the chronic course of ischemic heart disease and the more frequent occurrence of concomitant diseases in this age group compared to younger individuals. The studied patients were burdened with: arterial hypertension (74%), diabetes (31%), and overweight (27%). Despite the factors listed above, age did not have a significant impact on the patients' quality of life. A review of the relevant literature showed that both short-term and long-term quality of life improvements are observed in elderly patients after CABG in comparison to preoperative values; QoL levels of elderly patients are better or comparable with the population of their peers, while their QoL improvement is similar to that observed among younger patients with the same condition [14–18]. Peric *et al.* demonstrated that, despite the presence of coronary artery disease and concomitant disorders, the QoL of patients after coronary artery bypass grafting was better among the elderly patients, which stemmed from their adaptation to the disease and its acceptance [4].

Patients after cardiac surgery procedures were more often observed to suffer from anxiety and depression. The overlap of physical and mental symptoms in these patients significantly hinders their clinical evaluation [19]. Yohannes *et al.* demonstrated that increased levels of depression have a significant impact on quality of life reduction in patients after surgical treatment for coronary artery disease [11]. Furthermore, Newman *et al.* observed impairments of attention and concentration in patients during the early postoperative period, which were associated with the patients' emotional condition [20].

In a study 12.7% of patients were diagnosed with depression, while 23.5% suffered from anxiety during the early postoperative period. Similar results were obtained in our own study, which demonstrated that, after surgical treatment and early cardiac rehabilitation, the level of anxiety among patients was reduced from 44% to 21%, their sense of security increased from 25% to 35%, and their satisfaction from their level of fitness increased from 10% to 17%. Despite the QoL improvements in the listed areas, the results were not satisfactory. Poor mental condition of patients is attributed to many factors, including: fear of surgery, the convalescence process, social life limitations, dependence on others with regard to activities of daily life, and restriction of everyday activities [21].

Spezzaferri *et al.* reported that, after a year from the cardiac surgery, the levels of anxiety and depression in their subjects were significantly reduced, which likely resulted from early psychological intervention and early re-

habilitation [22]. Statistical data concerning the occurrence of depression in patients after cardiac surgery vary; the reported rates range from 15% to 47%. It has been demonstrated that depression in patients after coronary artery bypass grafting is an independent factor for cardiovascular event recurrence and repeated hospitalization. Therefore, particular attention should be paid to the patient's psychosocial behavior; when necessary, the patient should be provided with specialist care [23–26].

Studies by Lee *et al.*, Pack *et al.*, and Dayan *et al.* reported that early rehabilitation significantly contributed to the reduction of long-term mortality rates among CABG patients [27–29]. In turn, a study by Pourafkari *et al.* from 2016 demonstrated that an 8-week program of cardiac rehabilitation significantly reduced the level of depression in patients after CABG [30]. Similar results were obtained by Yohannes *et al.*; in their study, a 6-week rehabilitation program significantly improved QoL, including physical activity, and this improvement persisted for up to 12 months [11]. Our study also demonstrated QoL improvements. The prevalence of anxiety was reduced from 44% to 21%, and the patients experienced fewer subjective ailments. Before the start of treatment and rehabilitation, chest pain, dyspnea, and fatigability were experienced by, respectively 68%, 50%, and 40% of patients; after the procedure these rates decreased to 10%, 12%, and 33%. However, only 34% of patients believed that their health status was good, while a half of the patients were unable to define it. The subjects continued to complain of sternal pain (53%) and leg pain (25%), which can be explained by the short period of time that had passed since the surgery.

In short, improvements in all QoL areas were demonstrated both in the literature and our own studies. Regardless of the time passed since the completion of surgical treatment and despite the QoL improvements, the results remain unsatisfactory when we consider the psychological and social aspects of the patients' lives. Persisting high levels of anxiety and low levels of independence were factors that had a significant negative impact on QoL. This indicates a need for holistic care that would involve physicians, nurses, physiotherapists, psychologists, and the patients themselves.

This process should be continuous, widespread, available, early, and comprehensive, encompassing all aspects of the patient's life. The rehabilitation process must be continued in order to maintain the achieved effects, further improve the quality of life, and provide education to patients after surgical treatment for coronary artery disease.

Conclusions

Early cardiac rehabilitation improved the quality of life of patients after coronary artery bypass grafting as well as their awareness regarding physical activity and the required lifestyle changes.

Disclosure

Authors report no conflict of interest.

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QUESTIONNAIRE

Dear Sir or Madam, we invite you to fill out the following questionnaire concerning your quality of life after surgical treatment for coronary artery disease (bypass grafting). Your participation is completely anonymous and voluntary.

Sex: Woman [] Man [] **Age:**

Place of residence: Urban [] Rural []

Education: Primary [] Secondary [] Vocational [] Higher []

Marital status:

What is/was your occupation? Physical work [] Intellectual work []

Was your coronary artery bypass grafting procedure:

a) Urgent [] b) Semi-elective [] c) Elective []

Would you describe your health status as good?

a) Yes [] b) No [] c) Difficult to say []

Are/were you a smoker?

a) No, never [] b) Yes, but I quit [] c) Yes, I smoke []

Please mark the conditions that affect you (more than one can be selected):

a) Arterial hypertension [] b) Overweight [] c) Diabetes []
d) Atherosclerosis []

Which ailments did you find most troublesome in you daily functioning? (more than one can be selected)

a) Chest pain [] b) Fatigability []
c) Dyspnea [] d) No ailments []
e) Leg pain [] f) Sternal pain []
g) Myocardial infarction [] h) Other []

Which aspects of your life were most affected by the disease? (more than one can be selected)

a) Physical fitness [] b) Mental well-being []
c) Hobbies and interests [] d) Household chores []
e) Professional work [] f) Relationships with family and friends []
g) Other []

Which aspects of your life improved the most after the surgery and rehabilitation?

a) Physical [] b) Mental []
c) Difficult to specify, it's too early after the procedure [] d) None []

When do/did you experience coronary pain?

a) During very long and heavy physical exertion []
b) When walking quickly or climbing stairs, after 200 m, after reaching the 2nd floor []
c) During everyday activities, after walking less than 200 m, before reaching the 2nd floor []
d) During minimal exertion or rest []
e) I did not experience coronary pain []

To what extent are/were your daily activities limited?

a) I did not experience any limitations of my daily activities []
b) My everyday activities were slightly limited []
c) I experienced significant limitations of my everyday activities []
d) My everyday activities were very limited []

Which of these activities did you find difficult? (more than one can be selected)

a) Dressing, using the bathroom [] b) Walking slowly [] c) Walking quickly []
d) Using stairs [] e) Household chores [] f) Recreation activities []
g) Sports [] h) Other []

Did you have to rely on the help of others with everyday activities?

a) Yes [] b) Only with some activities [] c) No []

What were your primary free-time activities?

a) Watching TV, reading books, sleeping []
b) Walking, movement, recreation []
c) Household chores, gardening []

What were your primary physical activities?

a) Household chores, gardening []
b) Professional work []
c) Recreation (swimming, cycling, walking) []
d) No activity []

How often did you engage in physical activity?

a) I am not physically active [] b) Once per month []
c) Twice per month [] d) Once per week []
e) Several times per week [] f) Every day []

Which of these experiences did you encounter? (more than one can be selected)

a) Anxiety [] b) Helplessness [] c) Fatigue []
d) Loss of independence [] e) Sense of independence []
f) Sense of security [] g) Satisfaction from your level of fitness []

Did you experience health-related anxiety?

a) Yes, often [] b) Yes, sometimes [] c) Yes, but rarely [] d) No []

What is your role in the treatment and rehabilitation process?

a) I have no influence over the improvement of my health. []
b) My influence over the improvement of my health is very limited. []
c) My engagement has a significant influence over the improvement of my health. []

Your quality of life after the treatment and rehabilitation:

a) ... is better than before the surgery []
b) ... has not changed []
c) ... is worse than before the surgery []
d) ... is difficult to evaluate so early after the surgery []

In what ways was your treatment and rehabilitation process helpful? (more than one can be selected)

a) I tire less easily []
b) I feel better []
c) I know what I should change in my lifestyle []
d) I know my capabilities []
e) I am not afraid of returning to everyday obligations []
f) It has not helped me at all []

Are you going to rely on the help of others after leaving the hospital?

a) Yes, I cannot imagine functioning on my own []
b) Yes, but only with some activities []
c) No, I will not require help []

Are you considering going back to professional work?

a) Yes []
b) No []
c) I don't know yet []
d) No, I'm on pension/retired/unemployed []