




Those who are more ill more often refuse help to get healthier: the cardiac rehabilitation acceptance paradox

Dlaczego bardziej chorzy rezygnują z szansy na wyzdrowienie?
Paradoks podejmowania decyzji o udziale w rehabilitacji kardiologicznej

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Abstract

Introduction. Coronary heart disease is the leading cause of death in industrialised countries. Cardiac rehabilitation allows improvement of functioning after acute coronary syndrome (ACS). It is important to identify the factors that have an impact upon treatment and rehabilitation decisions. We aimed to assess the impact of the clinical characteristics of ACS pts upon the decision to participate in an early inpatient cardiac rehabilitation programme (ICR).

Material and methods. 137 patients after ACS (70% ST-elevation myocardial infarction) treated with primary percutaneous coronary angioplasty were enrolled in the study. Quality of life questionnaire (EuroQoL-5D with Visual Analogue Scale) and depression score (Beck Depression Inventory) was collected at discharge from cardiology department (5 ± 2 days after ACS). All patients were asked to participate in a three-week-long ICR programme. Depending on approval or refusal, the patients were divided into two subgroups.

Results. The group without ICR had lower median values of red blood count, haemoglobin and haematocrit compared to the rehabilitation group. The objectors had higher total cholesterol, low-density lipoproteins cholesterol, and Gensini score (40 ± 22.6 vs. 35 ± 24.3 , $p = 0.02$). There was a strong trend towards a lower median depression level in the ICR group compared to controls (8 ± 8.8 vs. 12 ± 8.5 , $p = 0.06$). No other statistically significant differences were identified between the groups.

Conclusions. Patients who refuse cardiac rehabilitation had a worse clinical profile compared to those who accepted ICR. A higher depression score was a borderline significant predictor of refusing ICR. Paradoxically, sicker patients are less willing to take part in rehabilitation and require more encouragement as part of their individualised treatment.

Key words: resignation, paradox, cardiac rehabilitation

Folia Cardiologica 2019; 14, 3: 223–229

Introduction

Ischaemic heart disease is one of the most common causes of death in industrialised countries, and is thus a world-leading health problem. More than 7 million people die of the disease annually, which corresponds to 12.8% of overall

mortality [1]. Myocardial infarction, a marker of the disease, occurs predominantly in adult and productive people, which means that the problem is not confined to patients and their families, but involves the whole of society [2].

Numerous studies have confirmed the advantages of participation in a suggested early cardiological

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rehabilitation programme (ICR). The actions involved aim at patient adaptation to a new lifestyle and his/her best achievable fitness, therefore having a holistic and complex impact on a patient. This allows not only improvement of somatic indices, but also of inseparable mental function [3], which should lead to an improvement of the subjectively perceived quality of life. This term is understood as being the way in which a person perceives his/her position in the world and associated possibilities of reaching goals and realising interests. Health-related quality of life (HRQL) assumes that health is an indispensable factor for optimal quality of life. Its subjective assessment may influence both the decision regarding therapy or rehabilitation, and the course of those processes [4, 5]. Scientists have stressed the role of cardiology rehabilitation as a method for improving not only somatic, but also mental, function [6]. Rehabilitation allows also restoration of social roles and a return to professional life. Participation in a cardiology rehabilitation programme favours a pro-health lifestyle and a reduction of major risk factors [7]. The efficacy of cardiology rehabilitation has also been the subject of numerous meta-analyses. Their results indicate that ICR not only significantly reduces cardiac-associated mortality, but also overall mortality. A statistically significant reduction of mortality in the group of people subject to cardiology rehabilitation was observed both in a one-year and a two-year observation, and reached the level of 47% compared to the group of non-participants [8, 9].

Benefits associated with participation in the ICR may involve also factors such as quality of life. This may be largely improved due to the elimination of symptoms hindering everyday functioning, including reduction of cardiology complaints, weariness, stress, and improvement of overall psychosocial function [10].

Depression is a condition that influences both the development of cardiological diseases, and the decision on treatment and a real assessment of its efficacy. Depression may contribute to an increased risk of cardiovascular diseases, and modify their course. The results of clinical trials indicate that the incidence of severe depression in ischaemic heart disease patients, including those with myocardial infarction, is 16–23%, and depression symptoms are diagnosed in 31–60% of those patients [11].

The consequences of developing depression symptoms may be serious in patients with coronary disease. Results of studies on patients with a history of myocardial infarction indicate anything from a two-fold to a four-fold higher risk of subsequent coronary events, cardiac-related death, and all cause mortality [12, 13].

Depression is also associated with severe course and inferior prognosis, including the increased risk of death, of coronary disease patients and of previously healthy individuals. The diagnosis of depression in patients with ischaemic heart disease poses a serious problem. Patients

are often afraid of being stigmatised as mentally ill, and sometimes they are unaware of their condition and related symptoms. They tend to minimise the intensity of encountered depression symptoms, and, if they focus their attention on them, they tend to explain them as being the result of the co-existent somatic disease. Most often they mention persistent tiredness, loss of energy, and some untypical somatic problems, including dyspnoea, palpitations, and non-specific pains in the chest [14, 15].

The purpose of this study was to assess the effect of clinical features of the health of patients with a history of acute coronary syndrome on the process of making a decision regarding whether to take part in a programme of stationary cardiological rehabilitation.

Material and methods

A group of 137 patients with acute coronary syndrome [non-ST-elevation myocardial infarction (NSTEMI), ST-elevation myocardial infarction (STEMI)] hospitalised in the Cardiology Department was recruited. Patients who gave their written consent to participate in the study were asked to fill out questionnaires regarding their quality of life and their perceived depression level, and to return them on the discharge day [5 ± 2 days after the myocardial infarction (MI)]. All patients were invited to a three-week ICR programme. Depending on whether they agreed or refused, patients were divided into two subgroups: I (N = 98 patients) comprising those accepting the invitation to participate in the programme; and II (N = 39 patients), those refusing to participate.

Following their discharge from the hospital, patients in Group I continued treatment in stationary conditions at the Department of Cardiology Rehabilitation. Psychological rehabilitation was a significant and regular element of that treatment. Provided workshops involved elements of psychotherapy and psycho-education, as well as relaxation training and exercises aimed at preparation for better stress handling. Patients in the rehabilitated group were asked to fill out the aforementioned questionnaires during the last week of the cardiology rehabilitation programme, and once again three months after discharge from the Cardiology Department. Also patients in Group II were asked to answer the same questionnaires three months after the acute coronary event.

EuroQol EQ-5D

Quality of life was tested using the EuroQol EQ-5D questionnaire with the Visual Analogue Scale (VAS). EQ-5D is a standardised tool for tests of health-related quality of life, allowing clinical and economic evaluation of health status in a population. The descriptive part of EQ-5D investigates five dimensions of health: ability to move, self-care, usual activity, pain/discomfort, and anxiety/depression. Each

dimension has three possible answers: no problems, some problems, or serious problems. A subject is asked to define his/her health condition by ticking one of these three answers for each of the five dimensions.

The visual analogue scale EQ-VAS resembles the scale of a thermometer, and allows definition of the current health condition. Subjects are asked to draw a line connecting the words 'Your health status today' to a selected point on the scale that seems to them to be the best description of their current health condition [16].

The Beck Depression Inventory

Intensity of depression symptoms was measured with the Beck Depression Inventory (BDI). This scale involves 21 points determining the most common symptoms of depression. A subject determines the intensity of each symptom according to his/her subjective judgement, scoring each point from 0 to 3, where 0 stands for absence of symptoms, and 3 stands for the highest intensity of a symptom. Scores are totalled. A final score of 0–9 indicates no depression, a score of 10–19 suggests mild depression, a score of 20–25 indicates moderate depression, and a score over 26 may suggest severe depression.

To be able to correctly diagnose depression disorders, a psychiatric examination is necessary. However, considering the low availability of that type of diagnostics in a hospital setting, and the demand for a simple screening diagnostic process, a psychological test was applied, allowing estimation of the intensity of depression symptoms that could suggest existence of the disease.

BDI was chosen for this study because it is a tool of relatively high psychometric reliability [15]. A great advantage of BDI is also its convenience, as the scale allows independent assessment of existing depression symptoms within a definite unit of time (so symptoms developing within the last month were analysed in the study).

Results of laboratory tests were analysed in both groups: lipid profile [total cholesterol, low-density lipoproteins (LDL), high-density lipoproteins (HDL), triglycerides], arterial pressure, body mass index (BMI), and blood cell count. Results of parameters acquired from standard electrocardiogram (ECG) investigations have been also elaborated [17], as well as angiographic investigation results, including the number of atherosclerotic blood vessels and the Gensini score. These figures were taken from patients' medical files provided at discharge from the Cardiology Department after acute coronary syndrome.

Results

Characteristics of the study group

One hundred and thirty seven patients after acute coronary event (70% STEMI), aged 31–65 years participated in the study. Group I, patients participating in the programme of

stationary cardiology rehabilitation, consisted of 98 subjects [women N = 25 (25.5%); mean age 56 ± 6.7 years; mean ejection fraction (EF) $45 \pm 7.6\%$]. Group II, patients refusing to participate in cardiology rehabilitation, consisted of 39 patients [women N = 11 (28.2%); mean age 56 ± 6.8 years; mean EF $46 \pm 7.7\%$]. Detailed characteristics are set out in Table 1.

Table 1. Baseline characteristics of study group*

| Parameter | Value |
|--|-------------------|
| Number of patients [N] | 137 |
| Age [years] | 57 (31–65) |
| Body mass index [kg/m ²] | 27.8 (18–41) |
| Female gender, N [%] | 36 (26.28) |
| Heart failure | |
| Ejection fraction [%] | 45.3 ± 7.7 |
| Angiographic parameters | |
| Number of vessels with coronary artery stenosis | 1 (0–4) |
| Gensini score | 35 (0–136) |
| Medical history | |
| Acute coronary syndrome, N [%] | 24 (17.52) |
| Smoking, N [%] | 61 (44.53) |
| Hypertension, N [%] | 83 (60.58) |
| Diabetes mellitus type 2, N [%] | 26 (18.98) |
| Biochemical parameters | |
| Sodium [mg/dL] | 139.09 ± 2.77 |
| Potassium [mg/dL] | 4.07 ± 0.41 |
| Chloride [mg/dL] | 101.2 ± 3.0 |
| Glucose [mg/dL] | 101 (70–313) |
| Creatinine [mg/dL] | 0.93 (0.47–2.6) |
| Urea [mg/dL] | 31 (12–77) |
| Lipid profile | |
| Total cholesterol [mg/dL] | 203 (95–414) |
| LDL cholesterol [mg/dL] | 128.8 ± 39.2 |
| HDL cholesterol [mg/dL] | 45 (17–98) |
| Triglycerides [mg/dL] | 146 (32–732) |
| Morphology | |
| Erythrocytes $\times 10^6/\mu\text{L}$ | 4.5 (3.39–5.87) |
| Leukocytes $\times 10^3/\mu\text{L}$ | 8.9 (4.6–16.7) |
| Haemoglobin [g/dL] | 14.1 (4.48–17.7) |
| Haematocrit [%] | 41.2 (13.2–51.5) |
| Mean corpuscular haemoglobin concentration [mg/dL] | 34.2 (29.4–36) |
| Platelets $\times 10^3/\mu\text{L}$ | 218 (119–478) |
| Psychological parameters | |
| Beck Depression Inventory | 10 (0–40) |
| Quality of life (Visual Analogue Scale) | 58.3 ± 19.8 |

*Data presented as mean \pm standard deviation or number (percentage); LDL – low-density lipoproteins; HDL – high-density lipoproteins

The population of patients refusing cardiology rehabilitation was in demographic terms similar to Group I. However, some significant differences in the results of additional investigations were observed between the groups. Compared to Group I, Group II demonstrated lower median values of red blood count (RBC) ($4.24 \pm 0.42 \times 10^6/\mu\text{L}$ vs. $4.53 \pm 0. \times 10^6/\mu\text{L}$, $p = 0.009$), haemoglobin (Hgb) level (13.5 ± 1.93 mg/dl vs. 14.3 ± 1.17 mg/dl; $p = 0.042$), and hematocrit (HTC) ($39.1 \pm 5.5\%$ vs. $41.8 \pm 5.1\%$, $p = 0.0008$). Higher total cholesterol level (226 ± 56 mg/dL vs. 189.5 ± 50 mg/dL, $p = 0.049$), LDL cholesterol (149 ± 37 mg/dL vs. 124 ± 39.2 mg/dL, $p = 0.021$) was found in Group II, as well as more advanced atherosclerosis of coronary arteries according to the Gensini score (40 ± 22.6 vs. 35 ± 24.3 , $p = 0.0187$). A strong trend towards lower median value of results in the BDI was observed in the rehabilitated group compared to Group II (8 ± 8.8 vs. 12 ± 8.5 , $p = 0.0578$). Results are presented in Table 2. Considering various types of distributions, Table 2 presents results as a median value (interquartile interval, the p value from t-Student or Mann-Whitney test).

Neither group of patients was significantly different from each other in terms of quality of life. Both in individual categories of the EQ-5D test, the descriptive part of which tests five dimensions of health: ability to move, self-care, usual activity, pain/discomfort, and anxiety/depression, and in the VAS-assessed QoL, there were no statistically significant differences between the groups. In none of the groups did the level of intensity of depression symptoms, or the level of quality of life, change significantly during the three-month observation period.

Discussion

According to the World Health Organisation (WHO), ischaemic heart disease is the fourth most serious health problem worldwide. Its aetiopathogenesis is complex. However, a growing body of evidence indicates a role for psychological factors in both its development and course, and in the therapeutic process and rehabilitation. Those factors also have an important effect on the self-assessment of health conditions and the process of making healthcare decisions associated with that assessment.

Depressive mood disorders may also be a consequence of cardiological problems, and often remain neglected [18]. Depressed patients are at a higher risk of coronary disease, and patients with coronary disease more often report mood disorders. The co-existence of both conditions leads to in-depth analysis of their mutual correlations [19].

This may mean that patients who underestimate their symptoms may tend to delay their visit to a doctor and therapy, which may account for an inferior health condition at admission to a hospital. Such patients may also be unaware

of the consequences of their condition, which may lead to them underestimating risks and necessary therapeutic actions, including stationary cardiology rehabilitation [20]. When confronted with the fact that their symptoms are chronic and persistent, these patients may evaluate their condition as not susceptible to treatment, which would have a significant effect on their decision whether or not to take part in cardiology rehabilitation [21].

Study results indicate that a cardiology rehabilitation programme is more frequently rejected by people who are in a less favourable health condition, including increased total cholesterol level, LDL level, and inferior atherosclerosis indices according to the Gensini score. This may also mean that their previous functioning had not been altered despite the occurrence of first complaints, or that attempted changes had been ineffective [22].

Participation in rehabilitation assumes a change of lifestyle to a more active one, necessary control of the current health condition, and the introduction of a diet. In order for this to happen, a patient has to understand that his/her complaints have been caused by their previous lifestyle, and has to take responsibility for his/her own health. Data obtained from analysis of results of the study suggests that inferior health condition of patients post acute coronary event may contribute to the decision not to participate in the cardiology rehabilitation programme.

This is a new observation, one that has never been mentioned in the literature before.

This observation adds additional value to this study, as it allows better understanding of those patients who reluctantly participate in a cardiology rehabilitation programme.

The single-centre character and relatively low count of the analysed population, and particularly a low percentage of patients in the control group, are limitations of our study. The study was directed at determining the characteristics of a patient who refuses cardiology rehabilitation, and included no effects of other factors, including those related to the medical personnel, and non-medical (family, social) reasons for refusal. For that reason, the results presented here demonstrate a patient's choice as a consequence of his/her health profile. Another possible limitation is the fact that the Beck Depression Inventory is insufficient to diagnose depression, but only indicates the level of intensity of depression symptoms.

Conclusions

Patients who reject participation in a stationary cardiology rehabilitation programme present an inferior clinical profile, in terms of laboratory and angiographic parameters, compared to patients who accept in-patient rehabilitation after an acute coronary event. Differences in blood cell count may reflect inferior health condition (an ischaemic and inflammatory aspect) that may lead to insufficient evaluation of the patient's own abilities, physical fitness and

Table 2. Differences between study group and control group*

| Parameter | Study group | Control group | p** |
|--|------------------|------------------|-------|
| N | 98 | 39 | |
| Age [years] | 57 (31–65) | 59 (40–65) | 0.5 |
| Body mass index [kg/m ²] | 28 (18–41) | 27 (18–40) | 0.8 |
| Female, N [%] | 25 (26) | 11 (28) | 0.8 |
| Ejection fraction [%] | 46 (26–60) | 47 (27–63) | 0.4 |
| Angiographic parameters | | | |
| Number of vessels with coronary artery stenosis: | 1 (0–4) | 1 (0–3) | 0.07 |
| • 1 vessel | 68 | 25 | 0.3 |
| • 2 vessels | 18 | 4 | 0.2 |
| • 3 vessels | 12 | 10 | 0.06 |
| Gensini score | 35 (0–136) | 40 (11–112) | 0.02 |
| Medical history | | | |
| Acute coronary syndrome, N [%] | 16 (16) | 8 (21) | 0.6 |
| Smoking, N [%] | 43 (43) | 18 (46) | 0.9 |
| Hypertension, N [%] | 59 (60) | 24 (62) | 1.0 |
| Diabetes mellitus type 2, N [%] | 20 (20) | 6 (15) | 0.6 |
| Biochemical parameters | | | |
| Sodium [mg/dL] | 139 (131–146) | 139 (134–144) | 0.7 |
| Potassium [mg/dL] | 4.07 (3–5.4) | 4,22 (3.2–4.8) | 0.2 |
| Chloride [mg/dL] | 101 (93–110) | 101 (95–111) | 0.4 |
| Glucose [mg/dL] | 101 (74–277) | 107 (70–313) | 0.6 |
| Creatinine [mg/dL] | 0.92 (0.47–2.6) | 0.95 (0.6–1.4) | 0.7 |
| Urea [mg/dL] | 31 (12–77) | 30.5 (15–54) | 0.9 |
| Lipid profile | | | |
| Total cholesterol [mg/dL] | 189.5 (106–414) | 227 (95–319) | 0.05 |
| LDL cholesterol [mg/dL] | 125 (40–246) | 149 (67–214) | 0.02 |
| HDL cholesterol [mg/dL] | 45 (24–78) | 40 (19–68) | 0.9 |
| Triglycerides [mg/dL] | 144 (32–732) | 160 (51–437) | 0.5 |
| Morphology | | | |
| Erythrocytes × 10 ⁶ /μL | 4.5 (3.4–5.7) | 4.24 (3.66–5.87) | 0.01 |
| Leukocytes × 10 ³ /μL | 8.4 (4.6–16.7) | 9.5 (6.3–14.6) | 0.01 |
| Haemoglobin [g/dL] | 14.3 (9.7–17.7) | 13.5 (4.48–16.9) | 0,04 |
| Haematocrit [%] | 41.8 (29.4–51.5) | 39.1 (13.2–51) | 0.001 |
| Mean corpuscular haemoglobin concentration [mg/dL] | 34.2 (29.4–36.0) | 34.2 (33.2–35.4) | 0.8 |
| Platelets × 10 ³ /μL | 218 (119–468) | 209 (155–329) | 0.5 |
| Psychological parameters | | | |
| Beck Depression Inventory | 8 (0–40) | 12 (1–34) | 0.06 |
| Quality of life | | | |
| Mobility | 3 (2–3) | 3 (1–3) | 0.2 |
| Self care | 3 (1–3) | 3 (2–3) | 0.6 |
| Usual activities | 3 (1–3) | 3 (1–3) | 0.5 |
| Pain/discomfort | 2 (1–3) | 2 (1–3) | 0.9 |
| Anxiety/depression | 2 (1–3) | 2 (1–3) | 0.6 |
| Quality of life (Visual Analogue Scale) | 60 (20–100) | 60 (5–100) | 0.6 |

*Data presented as median or number (percentage); **p value of < 0.05 is considered statistically significant; N – number of patients; LDL – low-density lipoproteins; HDL – high-density lipoproteins

potential benefits associated with them. The accompanying depression mood may account for the negative decision regarding participation in the cardiology rehabilitation, although our study demonstrated only a strong trend that failed to reach the level of statistical significance in that regard. Levels of other investigated psychological parameters were not significantly different, which may mean that a complex stationary cardiological rehabilitation had no direct effect on psychological aspects of the rehabilitation.

Thus, paradoxically, patients in a more serious condition may be less willing to participate in cardiology rehabilitation. They may require more attention and encouragement from medical personnel to fully exploit opportunities to improve their health based on scientific evidence.

Conflict(s) of interest

The authors report no conflict of interest.

Streszczenie

Wstęp. Choroba niedokrwienność serca zajmuje w czołowe miejsce wśród przyczyn zgonu w krajach uprzemysłowionych. Rehabilitacja kardiologiczna jest jednym z oddziaływań poprawiających funkcjonowanie po przebytych ostrym zespole wieńcowym (ACS). Ważną pozostaje identyfikacja czynników warunkujących decyzję o podjęciu leczenia i udziale w rehabilitacji. Celem pracy była ocena wpływu cech klinicznych stanu zdrowia pacjentów po przebytych ACS na podejmowanie decyzji o udziale w programie stacjonarnej rehabilitacji kardiologicznej (ICR).

Materiał i metody. Do badania włączono 137 pacjentów po przebytych ACS (70% zawałów serca z uniesieniem odcinka ST) leczonych metodą pierwotnej angioplastyki wieńcowej. Pacjenci byli proszeni o uzupełnienie i oddanie w dniu wypisania (5 ± 2 dni od wystąpienia zawału serca) kwestionariusza do oceny jakości życia (*EuroQoL EQ-5D* z Wizualną Skalą Analogową) oraz poziomu depresji (Skala Depresji Becka). Wszystkim pacjentom zaproponowano udział w 3-tygodniowym programie ICR. Zależnie od wyrażenia zgody lub rezygnacji z udziału w rehabilitacji pacjentów podzielono na dwie podgrupy.

Wyniki. Grupa II w porównaniu z poddaną rehabilitacji wykazała niższe mediany wartości hemoglobiny, liczby czerwonych krwinek oraz hematokrytu. Osoby z grupy kontrolnej cechowały również wyższe stężenia cholesterolu całkowitego i cholesterolu frakcji lipoprotein o małej gęstości oraz większe nasilenie miażdżycy tętnic wieńcowych obliczane za pomocą skali Gensiniego ($40 \pm 22,6$ v. $35 \pm 24,3$; $p = 0,02$). Obserwowano także silny trend w kierunku niższego poziomu depresji w grupie poddanej rehabilitacji w porównaniu z grupą kontrolną ($8 \pm 8,8$ v. $12 \pm 8,5$; $p = 0,06$). W zakresie innych parametrów nie stwierdzono istotnych statystycznie różnic między grupami.

Wnioski. Pacjenci, którzy odmówili udziału w ICR, cechowali się gorszym stanem klinicznym niż ci, którzy się na nią zdecydowali. Wyższy poziom nasilenia objawów depresji był jedynie granicznie istotnym predyktorem odmowy udziału w rehabilitacji. Paradoksalnie bardziej chorzy okazali się mniej skłonni do udziału w rehabilitacji kardiologicznej.

Słowa kluczowe: rezygnacja, paradoks, rehabilitacja kardiologiczna

Folia Cardiologica 2019; 14, 3: 223–229

References

1. Thygesen K, Alpert JS, Jaffe AJ, et al. Grupa tworząca niniejszy dokument w imieniu Wspólnej Grupy Roboczej ESC/ACCF/AHA/WHF ds. Uniwersalnej Definicji Zawału Serca. Trzecia uniwersalna definicja zawału serca. *Kardiologia Pol.* 2012; 70: 236–252.
2. Grupa Robocza Europejskiego Towarzystwa Kardiologicznego (ESC) do spraw postępowania w ostrym zawałe serca z uniesieniem odcinka ST. Wytoczne ESC dotyczące postępowania w ostrym zawałe serca z uniesieniem odcinka ST w 2017 roku. *Kardiologia Pol.* 2018; 76: 229–313.
3. Kang K, Gholizadeh L, Inglis SC, et al. Correlates of health-related quality of life in patients with myocardial infarction: a literature review. *Int J Nurs Stud.* 2017; 73: 1–16, doi: [10.1016/j.ijnurstu.2017.04.010](https://doi.org/10.1016/j.ijnurstu.2017.04.010), indexed in Pubmed: [28511032](https://pubmed.ncbi.nlm.nih.gov/28511032/).
4. Kowalska M, Szemik S. [Health and quality of life vs. occupational activity]. *Med Pr.* 2016; 67(5): 663–671, doi: [10.13075/mp.5893.00420](https://doi.org/10.13075/mp.5893.00420), indexed in Pubmed: [27819705](https://pubmed.ncbi.nlm.nih.gov/27819705/).
5. Karimi M, Brazier J. Health, health-related quality of life, and quality of life: what is the difference? *Pharmacoeconomics.* 2016; 34(7): 645–649, doi: [10.1007/s40273-016-0389-9](https://doi.org/10.1007/s40273-016-0389-9), indexed in Pubmed: [26892973](https://pubmed.ncbi.nlm.nih.gov/26892973/).
6. Piotrowicz R, Jegier A, Szalewska D. Rekomendacje w zakresie realizacji kompleksowej rehabilitacji kardiologicznej – stanowisko ekspertów

- Sekcji Rehabilitacji Kardiologicznej i Fizjologii Wysiłku Polskiego Towarzystwa Kardiologicznego. AsteriaMed, Gdańsk 2017.
7. Borowicz-Bienkowska S, Deskur-Smielecka E, Maleszka M, et al. The impact of short-term cardiac rehabilitation on changing dietary habits in patients after acute coronary syndrome. *J Cardiopulm Rehabil Prev*. 2013; 33(4): 234–238, doi: [10.1097/HCR.0b013e318293b47b](https://doi.org/10.1097/HCR.0b013e318293b47b), indexed in Pubmed: [23719149](https://pubmed.ncbi.nlm.nih.gov/23719149/).
 8. Taylor RS, Brown A, Ebrahim S, et al. Exercise-based rehabilitation for patients with coronary heart disease: systematic review and meta-analysis of randomized controlled trials. *Am J Med*. 2004; 116(10): 682–692, doi: [10.1016/j.amjmed.2004.01.009](https://doi.org/10.1016/j.amjmed.2004.01.009), indexed in Pubmed: [15121495](https://pubmed.ncbi.nlm.nih.gov/15121495/).
 9. Clark AM, Hartling L, Vandermeer B, et al. Meta-analysis: secondary prevention programs for patients with coronary artery disease. *Ann Intern Med*. 2005; 143(9): 659–672, indexed in Pubmed: [16263889](https://pubmed.ncbi.nlm.nih.gov/16263889/).
 10. Peixoto TCA, Begot I, Bolzan DW, et al. Early exercise-based rehabilitation improves health-related quality of life and functional capacity after acute myocardial infarction: a randomized controlled trial. *Can J Cardiol*. 2015; 31(3): 308–313, doi: [10.1016/j.cjca.2014.11.014](https://doi.org/10.1016/j.cjca.2014.11.014), indexed in Pubmed: [25633911](https://pubmed.ncbi.nlm.nih.gov/25633911/).
 11. Carney RM, Freedland KE, Miller GE, et al. Depression as a risk factor for cardiac mortality and morbidity: a review of potential mechanisms. *J Psychosom Res*. 2002; 53(4): 897–902, indexed in Pubmed: [12377300](https://pubmed.ncbi.nlm.nih.gov/12377300/).
 12. Sørensen C, Brandes A, Hendricks O, et al. Depression assessed over 1-year survival in patients with myocardial infarction. *Acta Psychiatr Scand*. 2006; 113(4): 290–297, doi: [10.1111/j.1600-0447.2006.00777.x](https://doi.org/10.1111/j.1600-0447.2006.00777.x), indexed in Pubmed: [16638073](https://pubmed.ncbi.nlm.nih.gov/16638073/).
 13. Penninx B, Beekman A, Honig A, et al. Depression and cardiac mortality. *Arch General Psychiatry*. 2001; 58(3): 221, doi: [10.1001/archpsyc.58.3.221](https://doi.org/10.1001/archpsyc.58.3.221).
 14. Yary T, Soleimannejad K, Abd Rahim F, et al. Contribution of diet and major depression to incidence of acute myocardial infarction (AMI). *Lipids Health Dis*. 2010; 9: 133, doi: [10.1186/1476-511X-9-133](https://doi.org/10.1186/1476-511X-9-133), indexed in Pubmed: [21087475](https://pubmed.ncbi.nlm.nih.gov/21087475/).
 15. Wilkowska A. Epizody depresyjne u pacjentów z chorobą niedokrwienną serca. *Psychiatr Prakt Klin*. 2008; 1: 12–21.
 16. Szende A, Williams A. Measuring self-reported population health: an international perspective based on EQ-5D. EuroQol Group, 2004. Perspective based on EQ-5D. EuroQol Group 2004. https://euroqol.org/wp-content/uploads/2016/10/Measuring_Self-Reported_Population_Health_-_An_International_Perspective_based_on_EQ-5D.pdf (5.06.2019).
 17. Kasprzak JD, Hoffman P, Płońska E, et al. Echokardiografia w praktyce klinicznej – Standardy Sekcji Echokardiografii Polskiego Towarzystwa Kardiologicznego. *Kardiol Pol*. 2007; 65: 8.
 18. Dessotte CA, Silva FS, Bolela F, et al. Presence of depressive symptoms in patients with a first episode of acute coronary syndrome. *Rev Lat Am Enfermagem*. 2013; 21(1): 325–331, indexed in Pubmed: [23546315](https://pubmed.ncbi.nlm.nih.gov/23546315/).
 19. Davidson KW, Bigger JT, Burg MM, et al. Centralized, stepped, patient preference-based treatment for patients with post-acute coronary syndrome depression: CODIACS vanguard randomized controlled trial. *JAMA Intern Med*. 2013; 173(11): 997–1004, doi: [10.1001/jamainternmed.2013.915](https://doi.org/10.1001/jamainternmed.2013.915), indexed in Pubmed: [23471421](https://pubmed.ncbi.nlm.nih.gov/23471421/).
 20. Mikkelsen T, Korsgaard Thomsen K, Tchijevitch O. Non-attendance and drop-out in cardiac rehabilitation among patients with ischemic heart disease. *Dan Med J*. 2014; 61(10): A4919, indexed in Pubmed: [25283618](https://pubmed.ncbi.nlm.nih.gov/25283618/).
 21. Shanks LC, Moore SM, Zeller RA. Predictors of cardiac rehabilitation initiation. *Rehabil Nurs*. 2007; 32(4): 152–157, indexed in Pubmed: [17650782](https://pubmed.ncbi.nlm.nih.gov/17650782/).
 22. McKee G, Biddle M, O'Donnell S, et al. Cardiac rehabilitation after myocardial infarction: what influences patients' intentions to attend? *Eur J Cardiovasc Nurs*. 2014; 13(4): 329–337, doi: [10.1177/1474515113496686](https://doi.org/10.1177/1474515113496686), indexed in Pubmed: [23818214](https://pubmed.ncbi.nlm.nih.gov/23818214/).