

## Psychosocial adaptation to chronic heart failure in patients with coronary heart disease

A.G. Zhidyaevskij\*, G.S. Galyautdinov, V.D. Mendelevich,  
A.G. Gataullina, A.O. Kuzmenko

Kazan State Medical University, Kazan, Russia

### Abstract

**Aim.** To assess the effects of acquired social status, neurotic conditions, type D personality, cognitive functions, quality of life and adherence to treatment on psychosocial adaptation of patients with coronary heart disease (IHD) to chronic heart failure (CHF), depending on the severity of decompensation.

**Methods.** 87 patients with coronary artery disease and chronic heart failure aged between 55 and 72 years were examined. All patients were divided into two groups depending on the functional class of chronic heart failure [New York Heart Association (NYHA) class I–IV]. The first group included 41 patients with NYHA functional class I–II, the second group — 46 patients with NYHA functional class III–IV. For a comprehensive study of the psychosocial adaptation of patients, a set of standardized questionnaires was used: the abridged variant of the Minnesota Multiphasic Personality Inventory (SMOL), a clinical questionnaire for identifying and assessing neurotic condition, the Minnesota Living with Heart Failure Questionnaire (MLHFQ), the 36-Item Short Form Health Survey Questionnaire (SF-36), the Mini Mental State Examination (MMSE), 14-question test “Type D Scale-14” (DS14), Morisky–Green test, the short version of the AUDIT questionnaire (AUDIT-C). We collected data on the patient's social status: gender, education, income level. The results obtained were analyzed.

**Results.** Based on the SMOL personality profiles, patients of the second group were classified as neurotic — an increase was noted in three neurotic scales: hypochondria ( $U=541$ ;  $p=0.030$ ), hysteria ( $U=579$ ;  $p=0.048$ ), and autism/schizoid ( $U=577.5$ ;  $p=0.047$ ) compared with patients of the first group. According to the results of the clinical questionnaire for the identification and assessment of neurotic condition, the greatest differences were found between patients of first and second groups on the scale of autonomic disorders ( $U=571$ ;  $p=0.039$ ) and neurotic depression ( $U=576$ ;  $p=0.046$ ). Comparing the groups according to the MLHFQ score, quality of life in patients of the second group was markedly reduced ( $U=447.5$ ;  $p<0.001$ ). According to the SF-36 questionnaire, a decrease in the quality of life was also found in patients of the second group on the scale “Physical functioning” ( $U=554$ ;  $p=0.032$ ) and “Physical component of health” ( $U=573.5$ ;  $p=0.044$ ). The cognitive status in patients of the second group was significantly decreased compared with the first group ( $U=427$ ;  $p<0.001$ ). No significant differences were found in adherence to treatment between the two groups ( $U=757$ ;  $p=0.666$ ). Also, there were no patients with type D personality on both subscales ( $U=717.5$ ;  $p=0.483$ ,  $U=784$ ;  $p=0.933$ ) and according to the AUDIT-C scores, there are no significant differences between men ( $U=681.5$ ;  $p=0.257$ ) and women ( $U=728.5$ ;  $p=0.425$ ) in both groups of patients.

**Conclusion.** Signs of social maladjustment in patients with more severe NYHA functional class of the disease are expressed by significantly more pronounced social isolation (autism), a tendency to avoid communicating with others, isolation on their own problems and hypochondriacal attention to the somatic manifestations of chronic heart failure; probably, the main reason that reduces the level of social adaptation is a high score in neuroticism, which leads to a functional decrease in cognitive abilities and a significant deterioration in quality of life.

**Keywords:** chronic heart failure, psychosocial adaptation, cardiac rehabilitation.

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**Background.** Chronic heart failure (CHF) is one of the most common complications of cardiovascular diseases (CVD), which largely determines the course and prognosis of the patients [1]. In Russia, the prevalence of CHF in the population of different regions varies from 7% to 10%, of which the proportion of the population with verified clinically pronounced CHF [functional class (FC) II–IV] has increased from 4.9% to 8.8%. The prevalence of terminal CHF (FC III–IV) has significantly increased from 1.2% to 4.1% of cases [2].

The high prevalence of CHF and its effect on the prognosis of CVD makes the problem of CHF not only medical but also social. Investigation of the psychosocial aspects of CVD, assessing the influence of such factors on the development and prognosis of the underlying disease, is relevant [3]. One of the significant factors that influence the risk of CVD development is the presence of anxiety and depressive disorders [4]. The influence of such disorders on the course of heart disease is caused by psychological/behavioral (such as altered doctor–patient alliance, noncompliance with the treatment regimen, decreased attention, alcohol abuse, and smoking) and biological (such as activation of the hypothalamic–pituitary–adrenal axis, sympathoadrenal hyperactivity, activation of the blood coagulation system and inflammatory mechanisms, dysregulation of the vascular lumen, and aggravation of hypercoagulation) mechanisms [5–7]. Consequences include a decrease in the quality of life and impaired social adaptation [8]. Studies have identified common genetic mechanisms that determine the development of depression and major CVDs that can lead to CHF [9,10].

Moreover, a study recommended taking into account the close association of affective symptoms with a decrease in the cognitive potential of patients [11]. Cognitive and affective disorders could result in low treatment adherence [12]. Adequate and correct treatment directly affects the quality of life of patients with CHF, reducing the rate of readmission and mortality [13]. The quality of life has a direct effect on the CHF severity [14]. Thus, the presence of comorbid pathology significantly worsens the course of CVD and their prognosis [15].

Issues of the influence of social status of patients with cardiac conditions are actively considered. In particular, studies focused on the acquired (achieved) status of a person thanks to his own efforts, which is determined by education, profession, qualifications, position [16]. Researchers also assign a large role to the social environment in the acceptance of the disease, its management, and subsequent adaptation [17]. Others conducted a mandatory assessment of the emerging social iso-

lation, life (social) circumstances that have changed in the conditions of illness, and social support received from relatives and friends [18].

Sufficient evidences have presented that the patient's social status, in particular education level, has a significant effect on the severity of symptoms and disease [19, 20]. Thus, signs of depressive disorders are more often detected in patients with coronary heart disease (CHD), with a low education level and physical activity and bad habits [21,22]. Domestic studies have confirmed that patients with a higher education level have a lower risk of developing CHD symptoms and mortality [23,24]. The low socioeconomic status of the patient in combination with the above factors can also aggravate the CVD course and thereby worsen the prognosis for mortality [25, 26]. Excessive alcohol consumption and being a socially significant problem [27] have a negative effect on the cardiovascular system, significantly worsening the course of CHF [28,29].

Notably, the narrowing of social contacts, disability, lack of support and help from loved ones, and severe psychosocial isolation significantly reduce the adaptive capabilities of the body, increase the risk of occurrence, and worsen the CVD course [30].

The degree of risk for the development of the disease and possibility of switching on the adaptive mechanisms of the patient under changing conditions depend on the stability of the patient under the influence of the aforementioned factors. The patient's quality of life, medical prognosis, and success of cardiac rehabilitation measures largely depend on the success of adaptation to the disease [31–36].

To assess common factors that affect the prognosis, further treatment, and subsequent rehabilitation of patients with CHF, the term “psychosocial adaptation” is proposed. The authors of this study decipher this concept as a process of adaptation to a disease from a social, psychological, and clinical point of view. Despite the large number of publications related to the psychological characteristics of patients with CHF, affective disorders accompanying this disease, impaired cognitive functions, and changes in the quality of life, a unified approach to understanding the adaptation/adaptive potential of such a patient has not been established. With the use of existing methods, a doctor may find it difficult to choose a single method that would allow a clear assessment of the patient's adaptive capabilities in relation to the disease.

**Aim.** This study aimed to assess the influence of acquired social status, neurotic conditions, personality type D, cognitive functions, quality of life, and adherence to treatment on the psychosocial

adaptation of patients with coronary artery disease to CHF, depending on the severity of decompensation.

**Materials and methods.** In this study, 87 patients with coronary artery disease and CHF aged 55–72 years were examined. All patients received inpatient treatment at the Clinic of the Medical University of Kazan in the period from February 2019 to November 2020. The patients were divided into two groups comparable in age ( $U = 678.5$ ;  $p = 0.282$ ) and sex ( $U = 746$ ;  $p = 0.663$ ) depending on the value of the FC of CHF (FC I–IV). The first group included 41 patients with CHF FC I–II, and the second group included 46 patients with CHF FC III–IV.

The study was approved by the local ethics committee of Kazan State Medical University (Protocol No. 10 dated 12/18/2018). Examination was carried out according to a specially developed patient record. The card was independently filled out by the patient under the supervision of the researcher, and it included information on sociodemographic characteristics (such as sex, age, social and labor status, educational level, marital status, patient's self-assessment of income level, and disability) and risk factors (i.e., smoking and alcohol consumption).

The inclusion criteria were as follows: informed consent to participate, clinically proven coronary artery disease [37] and CHF diagnosed according to clinical guidelines [38,39] based on a complex of clinical, anamnestic (patient complaints and physical examination data), laboratory, and instrumental (results of general and biochemical blood tests and coagulograms) data, chest X-ray findings, electrocardiography, echocardiography, as well as data from additional research tests (6-min walk test, a scale for assessing the clinical state in CHF modified by V.Yu. Mareev) [40].

The exclusion criteria were as follows: severe and unstable condition that muddles the questionnaire survey, unstable angina pectoris, mental illness, dependence on psychoactive substances or addictive disorders (alcoholism and drug addiction), acute cerebrovascular accident, infective endocarditis, myocarditis, diffuse connective tissue diseases, oncological diseases, previous diagnosis dementia or encephalopathy of various origins, and a history of brain injury.

For a comprehensive study of the psychosocial adaptation of patients with coronary artery disease to CHF, a set of standardized questionnaires was used. To determine the characteristics of personal response and assess the degree of social adaptation, a short multifactorial questionnaire for personality research was used [41,42]. To examine the level of

neurotization, each patient was asked using a clinical questionnaire to identify and assess neurotic states (Yakhin KK, Mendeleevich DM, 1978) [43]. Quality of life was assessed using the Minnesota Living with Heart Failure Questionnaire (MLHFQ) [44] and the Short-Form 36 of the Health Survey Questionnaire (SF-36) [45]. Cognitive status was assessed according to the results of mental status assessment by mini-mental state examination (MMSE) [46]. To identify patients with type D behavior, the 14-item questionnaire “Type D scale (DS14)” was used [47].

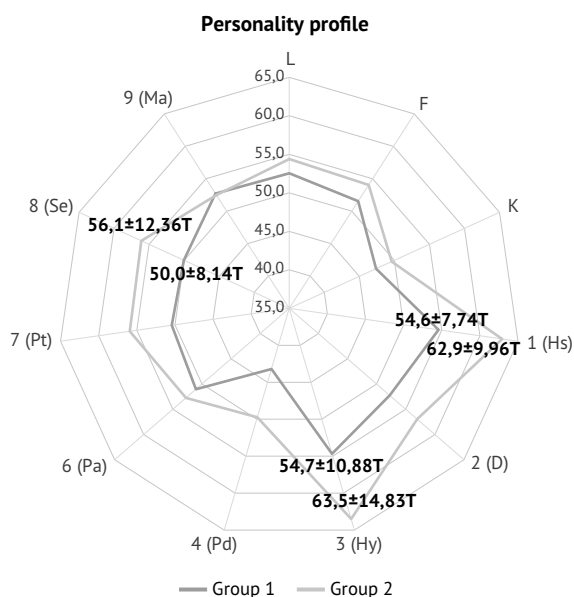
Compliance to treatment was assessed using the Morisky–Green test [48], and alcohol consumption was assessed using a short version of the Alcohol Use Disorders Identification Test (AUDIT-C) [49]. The assessment of income level was carried out on the basis of the methodological recommendations of the Federal State Statistics Service [50].

Results were statistically processed using the Microsoft Office Excel 2013 software package (IBM SPSS Statistics 21 software). Statistical analysis of the results obtained by calculating the Shapiro–Wilk criterion found that the studied indicators did not follow a normal distribution; therefore, their comparison was carried out using nonparametric statistics. Descriptive statistics are presented as mean  $\pm$  SD and median (with interquartile range). Mann–Whitney test was used to compare quantitative parameters between the groups; the differences were considered significant at  $p < 0.05$ .

**Results.** The observed groups included men and women with different levels of education and income. Among the patients of the first group, nine had higher education level and 32 did not have higher education level. Among patients in the second group, six had higher education level and 40 did not have higher education level. Data on the level of personal income were collected according to the information received from patients in accordance with the Rosstat methodology for calculating indicators of monetary income and expenditure of the population. As regards income, no significant differences were found between the two groups ( $U = 769.5$ ;  $p = 0, 807$ ).

Observables were interrogated using the short multifactorial questionnaire for personality research. The results of the questionnaire are presented as a graph showing the personality profile of the patients (Fig. 1).

Assessment of psychosocial adaptation using the short multifactorial questionnaire for personality research showed that the dominant personality profile in both groups was the fixation of patients' attention to somatic ill-being, a tendency to com-



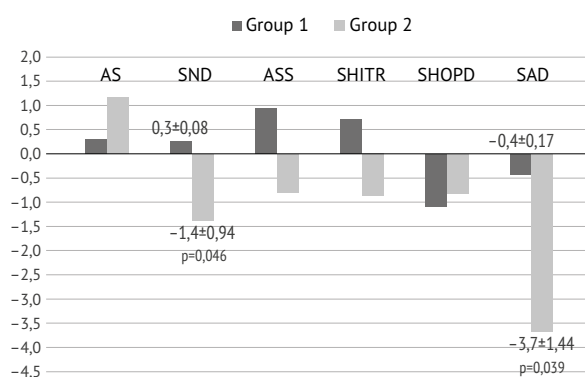
**Fig. 1.** Average profiles identified by the short multifactorial questionnaire for personality research of the observations (T-scores). Designation of the resin scales: L, lies; F, fairness; K, corrections; 1 (Hs), hypochondria; 2 (D), depression; 3 (Hy), hysteria; 4 (Pd), psychopathy; 6 (Pa), paranoia; 7 (Pt), psychasthenia; 8 (Se), schizoid; 9 (Ma), hypomania

plain constantly, egocentrism, and dramatization. The personality profile of patients with more severe FC (second group) was markedly different. It had a distinctly neurotic character – an increase in three neurotic scales was found in comparison with values on the rest of the scales. In the first group, such a profile was not found. A significant difference was found between the studied groups in terms of increasing T-points, hypochondria scales ( $U = 541$ ;  $p = 0.030$ ), and hysteria ( $U = 579$ ;  $p = 0.048$ ), as well as the autism/schizoid scale ( $U = 577.5$ ;  $p = 0.047$ ).

The results obtained may indicate a more pronounced social isolation of patients with severe CHF owing to the fixation of attention on somatic symptoms, which led to the desire to draw the attention of others (possibly from a close circle) and doctors to the subjective severity of CHF symptoms.

The results of assessing the level of neurotization are presented in Fig.2. When interpreting the questionnaire, values of  $-1.28$  and below are considered to prove the painful nature of the disorders.

On all scales assessing the severity of the neurotic type of response (with the exception of the scale of obsessive-phobic disorders), patients in the second group had more pronounced mental state. Greatest differences were found on the scales of autonomic disorders ( $U = 571$ ;  $p = 0.039$ ) and neurotic depression ( $U = 576$ ;  $p = 0.046$ ). The results obtained from the test for assessing early signs of



**Fig. 2.** Level of neurotization. A clinical questionnaire was used to identify and assess neurotic conditions (Yakhin K.K., Mendelevich D.M., 1978). Scale designation: AS, anxiety scale; SND, scale of neurotic depression; ASS, asthenia state scale; SHITR, scale of the hysterical type of reaction; SHOPD, scale of obsessive-phobic disorders; SAD, scale of autonomic disorders

neurotization confirmed the conclusions obtained from the analysis of the short multifactorial questionnaire for personality research. The values of the patients of the second group were in the zone of negative values, while this pattern was not found in the first group.

Further, the quality of life of patients was assessed using the MLHFQ and SF-36 questionnaires (Figs.3,4).

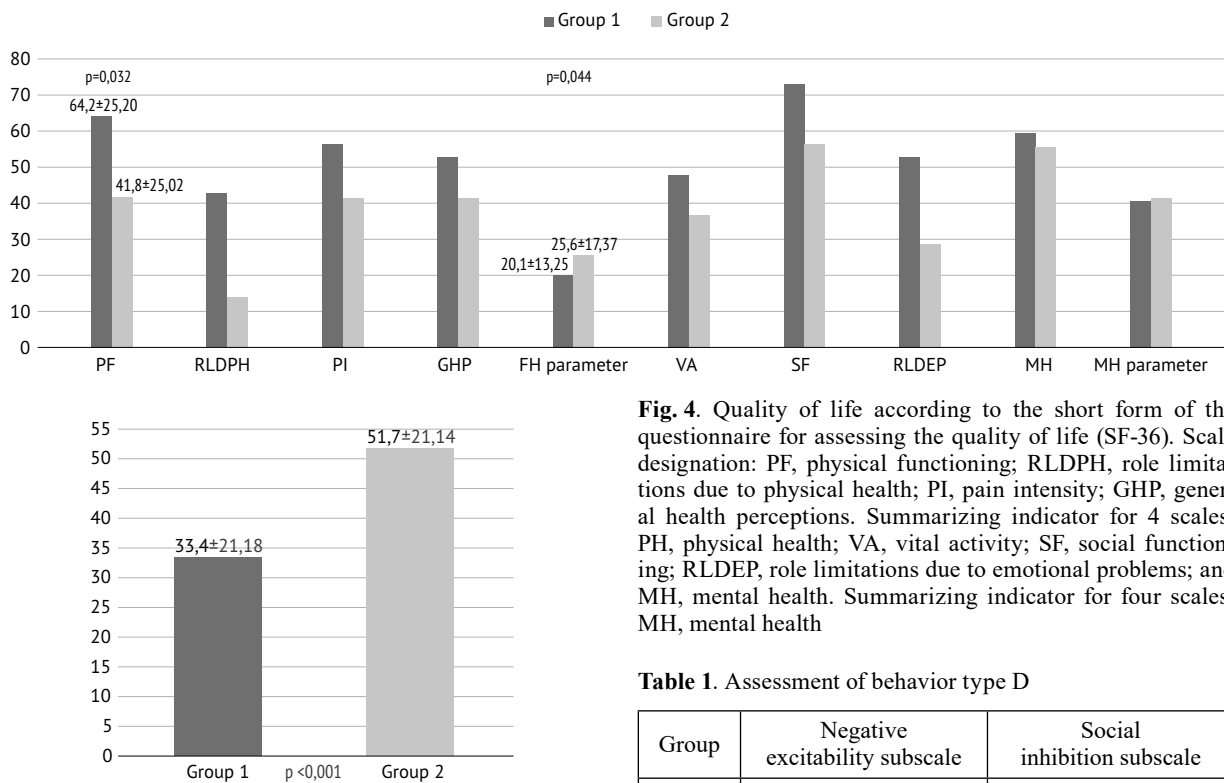
Results of comparing the two groups according to the MLHFQ questionnaire revealed differences ( $U = 447.5$ ;  $p < 0.001$ ): patients of the second group had a markedly reduced quality of life compared with the patients of the first group.

Results of the SF-36 questionnaire revealed a significant difference on the scale “Physical functioning” ( $U = 554$ ;  $p = 0.032$ ) and the indicator “Physical component of health” ( $U = 573.5$ ;  $p = 0.044$ ) between the first and second groups of patients.

Patients’ cognitive functions were assessed by using the MMSE questionnaire that helps identify signs of cognitive impairment. This is a screening method for doctors of any specialty, not intended to make a diagnosis. The lower the final score, the more pronounced the cognitive deficit. An indicator with  $>28$  points is considered normal. After detecting signs of cognitive impairment, the doctor decides to refer the patient to the appropriate specialist.

In the compared groups, a significant decrease in cognitive functions was found in patients of the second group with  $-23.9 \pm 4.10$  points compared with  $26.8 \pm 2.50$  points in patients of the first group ( $U = 427$ ;  $p < 0.001$ ).

Each patient was assessed for compliance of treatment for the underlying disease. Patients with



**Fig. 3.** Quality of life according to the Minnesota living questionnaire in patients with chronic heart failure

a final score of > 3 were considered compliant. In this study, no significant differences were found in the level of compliance ( $U = 757; p = 0.666$ ). Patients in the first and second groups scored  $1.92 \pm 1.31$  and  $-1.62 \pm 1.28$  points, respectively. However, the average compliance values suggest that patients in both groups do not adhere to treatment.

Personality type D (behavior type D), included in the list of psychosocial risk factors, has a significant effect on the onset and progression of CVD [51]. This personality type is characterized by an increased level of negative emotions such as anxiety, depressive moods, irritability, pronounced tendency to use maladaptive coping strategies, as well as social suppression and isolation [52].

In the questionnaire, seven questions refer to the negative excitability subscale, and the other seven to social inhibition. Patients who scored  $\geq 10$  points on both subscales tended to have personality type D. In our study (Table 1), patients of both groups scored subthreshold values, and we did not find significant differences between the study groups on the “negative excitability” subscale ( $U = 717.5; p = 0.483$ ) and “social inhibition” subscale ( $U = 784; p = 0.933$ ).

Alcohol consumption in both groups was analyzed according to AUDIT-C (Table 2). Test results indicated 0 as no alcohol consumption, and the test

**Fig. 4.** Quality of life according to the short form of the questionnaire for assessing the quality of life (SF-36). Scale designation: PF, physical functioning; RLDPH, role limitations due to physical health; PI, pain intensity; GHP, general health perceptions. Summarizing indicator for 4 scales: PH, physical health; VA, vital activity; SF, social functioning; RLDEP, role limitations due to emotional problems; and MH, mental health. Summarizing indicator for four scales: MH, mental health

**Table 1.** Assessment of behavior type D

Group	Negative excitability subscale	Social inhibition subscale
I	$9.0 \pm 4.42$	$9.5 \pm 5.07$
II	$10.2 \pm 6.93$	$9.3 \pm 5.66$

is considered positive if a male patient scored  $\geq 4$  points and a female patient scored  $\geq 3$  points.

**Discussion.** In this study, the mental state of patients with CHF FC III–IV was significantly different from the mental state of patients with CHF FC I–II. Signs of social maladjustment in patients with more severe FC were accompanied by significantly more pronounced social isolation (autism), a tendency to avoid communicating with others, isolation of their own problems, and hypochondriac fixation of attention on the somatic manifestations of CHF. Presumably, the main reasons that reduced the level of social adaptation of the patients in this group were autonomic disorders and depressive symptoms, which reduced the level of cognitive functioning of these patients.

In this study, fewer inpatients had higher education level, which is consistent with results of previous studies [19–24], demonstrating that this factor affects the course of CVD and confirms that patients with a higher education level have better adaptation to the disease and, in general, monitor their health; as a result, they rarely seek medical help.

Thus, the present results suggest that a complex of psychosocial factors significantly affects the decrease in the social adaptation of patients with varying severity of CHF decompensation. Among them, the severity of neurotization can

**Table 2.** Alcohol disorder test results of patients according to sex

Group	Male	Significance level	Female	Significance level
I	4.5 ± 2.83	U = 681.5. p = 0.257	1.6 ± 1.03	U = 728.5. p = 0.425
II	5.0 ± 3.00		1.7 ± 1.20	

No significant differences were found in the study groups, but among male patients of the first and second groups, this test result was positive.

lead to a functional decrease in cognitive abilities and a significant deterioration in the quality of life. Moreover, patients of both groups showed low adherence to treatment.

On the basis of the data obtained and existing information on the influence of certain causes on the course of CHF, the authors have developed a model that can enable comprehensive assessment of psychosocial adaptation to CHF (Fig. 5).

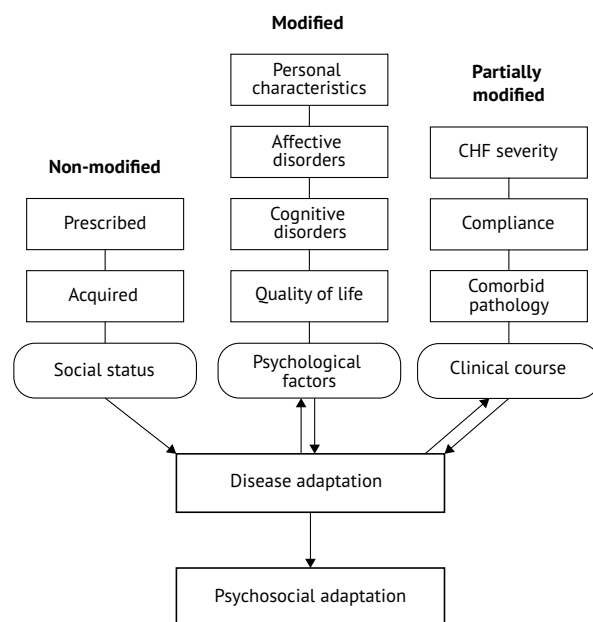
Three groups of factors are assumed to be involved in the process of adaptation to the disease, namely, social status, psychological factors, and clinical course of the disease. These groups of factors can be unmodifiable, modifiable, and partially modifiable. With a personalized approach to the patient, the doctor takes into account those factors that he is able to correct, which will allow the patient with CHF to better adapt to the disease.

The authors believe that this model should be transformed into a specialized questionnaire that allows assessment of the degree of impairment of the patient’s psychosocial adaptation to CHF and recommend an adequate rehabilitation approach based on the severity of the maladaptive process. In cardiac rehabilitation, depending on the severity of detected disorders, specialists such as a clinical psychologist, psychotherapist, psychiatrist, and cardiologist/therapist are involved [53].

**CONCLUSIONS**

1. Patients with severe decompensation of CHF were found to have common features and clear differences in the process of psychosocial adaptation to CHF. A complete list of identified causes that can take part in reducing psychological and social adaptation should be taken into account when working with such patients, including high-quality correction of violations and subsequent rehabilitation.

2. Taking into account the specificity of psychological changes in patients with CHF, mediated by individual personality traits, it appears reasonable to introduce a personalized approach that takes into account social status, severity of impairments, degree of decline in the quality of life, cognitive potential, and adherence to treatment. Doctor’s measures should aim at increasing the adaptive potential of the patient in relation to the disease and improving the quality of secondary prevention.



**Fig. 5.** Model of psychosocial adaptation to chronic heart failure in patients with coronary heart disease. *Social status.* Prescribed: sex and age. Acquired: education level, profession, position, and income. *Psychological factors.* Personal characteristics: personality profile and personality type. *Affective disorders:* anxiety–depressive disorders. *Cognitive impairment:* cognitive function. *Quality of life:* changing the quality of life. *Clinical course:* severity of CHF according to clinical guidelines. *Comorbid pathology:* concomitant diseases. *Compliance:* ←→ factors that a doctor can influence.

**Author contributions.** A.G.Zh. conducted the research and was responsible for collecting and analyzing the results and writing the text; G.S.G. and V.D.M. were work managers; A.G.G. and A.O.K. were involved in the collection and processing of materials.

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**Conflict of interest.** The authors declare that they have no conflicts of interest regarding the presented article.

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