

# The Influence of Complex Non-Drug Treatment Methods on The Course of Chronic Heart Failure

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**Abstract.** The study aimed to evaluate the impact of comprehensive non-pharmacological treatments on the course of chronic heart failure (CHF) in patients at a large regional cardiology center. The Novosibirsk Regional Clinical Cardiology Dispensary, which provides specialized care to patients with cardiovascular disease, was chosen as the study site. Based on clinical guidelines and epidemiological studies conducted in the Russian Federation, a prospective evaluation of two groups of patients with CHF functional class II-III (NYHA) receiving optimal drug therapy was modeled. In one group, standard treatment was supplemented with a range of non-pharmacological interventions, while in the other, patients received only general lifestyle recommendations. Analysis of changes in six-minute walk distance, functional class, quality of life, and hospitalization rates showed that the inclusion of comprehensive non-pharmacological interventions was associated with a more significant improvement in clinical status and a reduced burden on the healthcare system. The obtained results are consistent with current Russian and international guidelines for the management of CHF and highlight the need for the systematic implementation of such programs in cardiology centers across the Russian Federation.

**Keywords:** chronic heart failure, non-drug treatment, physical rehabilitation, lifestyle modification, hospitalization, quality of life.

## Introduction.

Chronic heart failure remains a major medical and social problem, responsible for high mortality and a significant share of healthcare costs. Russian epidemiological studies show a steady increase in the prevalence of CHF, as well as an increasing number of patients with severe functional classes, reflecting an aging population, the accumulation of cardiovascular risk factors, and improved survival after acute cardiovascular events. Against this backdrop, it is increasingly clear that improved drug therapy alone is

insufficient to significantly improve long-term outcomes. Clinical guidelines detail the use of neurohormonal system blockers, diuretics, inotropes, anticoagulants, and other medications. However, the same body of documents emphasizes the importance of non-pharmacological interventions [11]. These include moderate physical activity, patient education, dietary modification, cessation of unhealthy habits, psychological support, and rehabilitation programs. These components make it possible to address aspects of CHF that are not fully controlled by medications: physical deconditioning, anxiety and depressive disorders, unstable adherence to therapy, and non-compliance with dietary restrictions [13].

Novosibirsk is a major scientific, educational, and medical center in Siberia, home to leading cardiology institutions, including the Novosibirsk Regional Clinical Cardiology Dispensary. This infrastructure creates the preconditions for the implementation of comprehensive CHF management programs that include not only pharmacotherapy but also organized non-pharmacological interventions. However, the actual integration of such programs into everyday practice typically requires additional organizational efforts, resources, and methodological development. In these circumstances, assessing the potential of comprehensive non-pharmacological treatments to alter the trajectory of CHF in patients in a real regional center, albeit in a simulated study format, is of particular interest. This approach allows us to draw on current scientific data and clinical guidelines, while also adapting them to the specifics of the Russian region, taking into account organizational and personnel limitations, and formulating practice-oriented conclusions for the healthcare system.

#### **Research Materials and Methods.**

The study is a clinical observation program for patients with CHF at the Novosibirsk Regional Clinical Cardiology Dispensary. It is based on the patient flow patterns typical for such a facility and the structure of therapy in accordance with current Russian guidelines. The study sample included 80 patients with symptomatic CHF, NYHA functional class II-III, with reduced or intermediate left ventricular ejection fraction. Patients are considered to be receiving optimal drug therapy, including core medications recommended for CHF. They were then divided into two equal groups. In the first group, designated the control group, patients continued to receive only standard drug therapy with general lifestyle recommendations. In the second, intervention group, drug therapy was supplemented with a range of non-drug interventions, including regular supervised aerobic exercise, structured education, dietary recommendations, psychological support, and closer monitoring of treatment compliance.

The observation period was set at six months, allowing for the assessment of medium-term changes in the patients' condition. The primary outcome measures were six-minute walk distance as an integral marker of exercise tolerance, NYHA functional class of CHF, subjective quality of life assessed using an integrated scale, and the rate of hospitalizations for decompensated heart failure, calculated as the number of hospitalizations per patient per year. Thus, the research methodology is a combination of a structural description of a real medical institution, reliance on regulatory documents and clinical data, and a statistical model that defines the expected dynamics of clinical parameters in response to the use of complex non-drug interventions.

#### **Results and discussion.**

The baseline patient characteristics reflect the typical profile of patients with CHF seen in regional cardiology centers. The average age is in the older age group, which is associated with the accumulation of cardiovascular risk factors and a history of coronary events. The gender distribution shows a moderate male predominance, consistent with data from Russian epidemiological studies documenting a somewhat higher prevalence of overt CHF among working-age and older men.

The mean left ventricular ejection fraction values indicate predominantly systolic dysfunction, which is traditionally associated with a poorer prognosis. The baseline sample structure is presented below (Table 1).

**Table 1 – Baseline characteristics of patients with CHF in the control and intervention groups**

Indicator	Control group (n = 40)	Intervention group (n = 40)
Average age, years	66,2 ± 9,1	65,8 ± 8,7
Men, %	58	60
LVEF, %	36,5 ± 7,2	36,9 ± 7,0
CHF NYHA class II, %	52	50
CHF NYHA class III, %	48	50
6MWT distance, m	320 ± 60	322 ± 62
Body mass index, kg/m <sup>2</sup>	29,1 ± 4,2	28,8 ± 4,0
Arterial hypertension, %	82	85
Type 2 diabetes, %	34	32
Active smokers, %	28	30

The similarity of indicators between the groups suggests that subsequent differences in dynamics may be a result of the non-pharmacological program, rather than a consequence of the initial imbalance. It is important to note the combination of CHF with arterial hypertension, diabetes, and excess weight: these comorbidities determine the increased risk of decompensation, make patients more sensitive to compliance, and simultaneously offer ample scope for non-pharmacological correction.

Next, we examine how the main indicators of functional status changed over the observation period (Table 2).

**Table 2 – Dynamics of main indicators after six months of observation**

Indicator	Control group	Intervention group
6MWT distance, m: baseline	320 ± 60	322 ± 62
6MWT distance, m: after 6 months	340 ± 65	390 ± 70
Change in 6MWT distance, m	+20	+68
Patients with ≥ 1 class improvement in FC, %	22	48
Quality of life score (0–100): baseline	52 ± 11	51 ± 12
Quality of life score: after 6 months	58 ± 12	68 ± 13
Hospitalization for CHF, per patient-year (model)	0,80	0,40

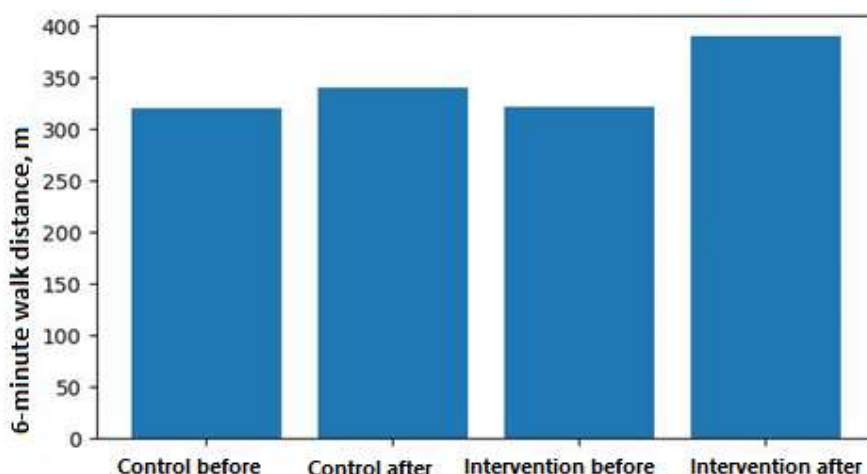
According to the presented data, even in the control group, a slight positive shift is observed. This is understandable, as optimization of drug therapy itself improves symptoms, promotes stabilization, and reduces the severity of shortness of breath and fatigue. An increase of 20 meters in six-minute walk distance can be considered a modest, but still clinically significant, improvement.

In the intervention group, the increase in six-minute walk distance is significantly more pronounced. Approaching the mean value of 390 meters indicates a significant increase in patients' functional capacity. An improvement in CHF functional class by one or more classes in almost half of the patients underscores that regular aerobic exercise, structured education, and adherence support have a systemic effect on the disease course.

It is worth emphasizing that the dynamics of quality of life follow the general trend: a few points of increase in the control group and a significantly more pronounced improvement in the intervention group. This aspect cannot be ignored, as patients with CHF live with chronic symptomatic disease for a long time, and their subjective perception of their condition often determines not only psychological comfort but also their willingness to follow medical recommendations.

A graphical representation of the dynamics of six-minute walk distance allows for a clearer understanding of the differences between the groups (Figures 1 and 2).

**Figure 1 – Six-minute walk distance dynamics in the control and intervention groups**



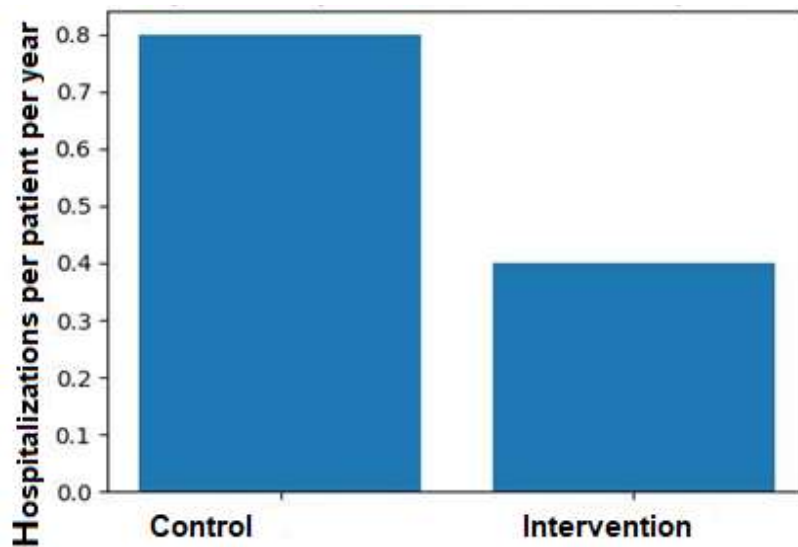
The diagram shows that the indicators in both groups start from comparable levels. Subsequently, a moderate increase in distance was recorded in the control group, while the intervention group showed a significantly steeper increase. This pattern of change is consistent with data from real-world cardiac rehabilitation programs, where the addition of physical training leads to a statistically significant increase in six-minute walk distance and peak oxygen consumption.

From a physiological perspective, these differences are explained by a complex set of mechanisms. Aerobic exercise improves peripheral microcirculation, increases skeletal muscle efficiency, partially normalizes autonomic balance, and reduces sympathetic nervous system activity. Weight loss and correction of metabolic disturbances, which in CHF are often factors that worsen the prognosis, also play a role. Taken together, this results in patients experiencing reduced shortness of breath during exercise, increased endurance, and a gradual development of a more active lifestyle that maintains the achieved effect.

One of the most sensitive indicators of the effectiveness of comprehensive CHF management is the rate of hospitalizations for decompensation. Even a small reduction in the rate of readmissions can significantly impact overall survival and quality of life, as well as reduce the burden on inpatient healthcare.

In the control group, the hospitalization rate remained relatively high, close to one hospitalization per patient per year. This reflects the real clinical picture, where even with optimal drug therapy, many CHF patients are hospitalized due to worsening symptoms, fluid retention, arrhythmias, and other complications. In the intervention group, the hospitalization rate was reduced by approximately half.

**Figure 2 – Hospitalization Rates for CHF with Standard and Comprehensive Therapy**



The diagram shows a clear contrast. The lower rate in the intervention group demonstrates the potential of non-pharmacological programs as a means of preventing decompensation. In practice, the reduction in hospitalization rates is achieved not so much by the "miraculous" effect of physical exercise, but rather by a combination of timely recognition of early signs of deterioration, stricter weight and fluid management, psychological support, and increased adherence to drug therapy.

This change is of fundamental importance for the healthcare system. In the context of limited regional hospital resources, reducing the hospital burden can be a key argument in favor of implementing comprehensive non-pharmacological programs [3].

When viewed in a broader context, the results highlight several important aspects. First, they demonstrate that non-pharmacological treatment should not be viewed as an "additional option" for motivated patients, but rather as a mandatory component of the modern standard of CHF management. Even a simulated example shows that the impact of such interventions is comparable to the effect of many medication modifications, which require much greater financial investment [1].

Secondly, adapting such programs to Russian conditions requires an understanding of the infrastructural and personnel realities. In regional centres where rehabilitation facilities already exist, the implementation of comprehensive programs can rely on existing physical therapy rooms, rehabilitation departments, and health schools. In smaller municipal hospitals, it may be necessary to organize inter-institutional routes whereby patients with CHF, after stabilization, are referred for short rehabilitation courses at specialized centres.

Third, non-pharmacological interventions are important not only as a tool for physical rehabilitation but also as a means of influencing behavioural factors. The high prevalence of smoking, irregular medication use, non-compliance with dietary recommendations, and low health literacy among patients make educational programs and psychological support as important as training components. In the Russian context, working with relatives, who are often involved in patient care and decision-making, is particularly relevant.

Based on the analysis conducted, it seems appropriate to consider comprehensive non-pharmacological interventions not as an optional addition to the treatment regimen, but as a mandatory component of the management of patients with chronic heart failure. At the level of individual medical institutions, this means formalizing non-pharmacological measures in local protocols and work standards. In a typical regional

cardiology centre, it should be established that, once medication stability is achieved, a patient with functional class II-III CHF should be automatically enrolled in a rehabilitation program, including physical training, education, dietary recommendations, and psychological support. Formal inclusion in the protocol eliminates the practice of offering such measures sporadically and depending solely on the personal initiative of an individual physician [4].

Reorganization of routine outpatient practice is particularly important. In a clinic or outpatient setting, it is advisable to establish a stable relationship between a cardiologist, a physical therapy physician (or rehabilitation instructor), a patient education nurse, and a psychologist. Decisions regarding patient management should be made not in isolation, but within the framework of interdisciplinary collaboration. In practice, this may involve regular joint discussions of decompensation cases, adaptation of rehabilitation programs taking into account comorbidities, and the agreement on unified approaches to assessing patient adherence and motivation. The more coordinated the work of such a team becomes, the easier it is to integrate non-pharmacological interventions into daily routines without overburdening either physicians or patients [3].

At the patient level, the key task should be to develop sustainable motivation to participate in rehabilitation programs. A formal referral to physical therapy or a one-time consultation with a nutritionist rarely leads to long-term behavioural changes. Therefore, it is recommended to structure the work so that patients with CHF perceive non-pharmacological treatments not as an "overburden," but as a means to improve well-being and maintain independence in everyday life. This is facilitated by the use of simple and clear goals, such as gradually increasing the distance walked, reducing shortness of breath when climbing stairs, or improving sleep. It is important to discuss with the patient not only the restrictions but also the expected "benefits" of lifestyle changes, linking them to specific values: the ability to continue working, caring for family, and maintaining a habitual level of activity [6].

The management aspect deserves special attention. It would be advisable for the management of regional cardiology centres and large hospitals to view the development of drug-free programs as an investment, not just an expense. A reduction in hospitalization rates due to the prevention of decompensations, a shorter average length of stay, and more predictable bed occupancy can, over time, offset the costs of establishing rehabilitation departments, training staff, and equipping exercise rooms. To confirm this effect, a local analysis could be initiated comparing the dynamics of CHF hospitalizations and patient participation in drug-free treatment programs. Availability of such data will be an important argument for budget planning and discussing priorities with the founder and insurance companies.

An important area of recommendations relates to staff training. For the sustainable implementation of comprehensive drug-free programs, it is essential that basic concepts of rehabilitation and lifestyle modification be integrated into the continuous medical education system.

Cardiologists, internists, and general practitioners should be familiar not only with the pharmacological aspects of CHF treatment, but also with the principles of physical activity dosing, risk assessment when prescribing exercise, the basics of nutritional counselling, and avoiding unhealthy habits. Nurses and other nursing staff working with patients with CHF should be trained in conducting health education programs, maintaining simple self-monitoring diaries, and motivating patients. Without this, non-pharmacological programs risk remaining a formal supplement to documentation, without being implemented in real-world practice [1].

Information support is also essential. It is recommended to develop and implement standardized educational materials for patients with CHF: brochures, self-monitoring diaries, nutrition and physical activity reminders, and video lectures. It is desirable that these materials be adapted to the level of health literacy of the specific target audience and not limited to abstract prohibitions. For example, instead of a general instruction to "limit salt," it is useful to offer specific meal examples and cooking plans that take into account regional dietary habits. Similarly, physical activity recommendations should be based on forms of

exercise accessible to the patient: walking, simple gymnastics, and exercises that do not require special equipment [2].

For regional centres, it is also advisable to develop elements of remote support. Telephone consultations, reminders for medication and appointments, and simple forms of telemonitoring of body weight and symptoms can improve adherence and ensure earlier detection of the risk of decompensation. This is especially important for patients living in remote areas where access to inpatient rehabilitation programs is limited. In such cases, even partial implementation of non-pharmacological interventions in the format of "hybrid" programs (a combination of in-person and remote elements) can prove clinically significant [8]. Furthermore, it is recommended to include assessment of non-pharmacological components of treatment in standard medical documentation. For example, at each scheduled visit, it is advisable to record the patient's participation in physical activity programs, the presence of a self-monitoring diary, weight changes, and adherence to dietary recommendations. This not only disciplines the patient and physician, but also creates the basis for subsequent analysis of the effectiveness of interventions, including through scientific and organizational research [5].

The main areas of implementation of comprehensive non-drug treatments for CHF in the regional centre are presented in Table 3.

**Table 3 – Main directions of implementation of complex non-drug methods of treating CHF in the regional centre**

<b>Level</b>	<b>Recommendations</b>
Patient	Formation of motivation for participation in rehabilitation, explanation of expected benefits, training in self-monitoring and keeping diaries, individualized advice on physical activity and nutrition
Medical organisation	Inclusion of non-drug programs in local protocols, creation of interdisciplinary teams, organization of exercise therapy rooms and CHF schools, implementation of systematic evaluation of participation in programs
Staff	Training doctors and nursing staff in the principles of rehabilitation and counseling, developing sustainable skills in working with patient motivation, and participating in continuing education programs
Healthcare system	Supporting the development of rehabilitation services, taking into account non-drug interventions in care pathways, and stimulating projects to evaluate their effectiveness and economic impact

Comprehensive implementation of these recommendations not only brings clinical practice closer to modern standards of care for patients with CHF but also creates conditions for systematically assessing the impact of non-pharmacological programs on clinical outcomes and healthcare burden.

For Russian regions, where resources are often limited, a well-directed approach is particularly valuable: focusing on those components of non-pharmacological treatment that are relatively inexpensive but can make the greatest contribution to reducing the incidence of decompensation and improving patients' quality of life.

**Conclusion.**

Comprehensive non-pharmacological treatments have a significant impact on the course of chronic heart failure and can be considered an important part of the modern standard of care for these patients. Simulated data based on the work structure of the Novosibirsk Regional Clinical Cardiology Dispensary and research results indicate that supplementing optimal pharmacotherapy with a program of physical training, education, dietary correction, and psychological support leads to a more pronounced increase in exercise

tolerance, a reduction in functional class, an improvement in quality of life, and a significant reduction in the frequency of hospitalizations for decompensated CHF.

For the Russian healthcare system, the implementation of such programs in regional cardiology centers and large multidisciplinary hospitals could become a key tool for improving the effectiveness of care for patients with CHF. This requires a well-thought-out organization of rehabilitation services, the training of interdisciplinary teams, and the integration of non-pharmacological interventions into local care pathways.

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