

## REHABILITATION OF PATIENTS WHO HAVE SUFFERED A NEW CORONAVIRUS INFECTION

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**Annotation:** The article is devoted to topical issues of physical rehabilitation as an integral part of the medical rehabilitation of patients who have suffered pneumonia associated with the new coronavirus infection COVID-19. Physical pulmonary rehabilitation is primarily aimed at the prevention of early and late complications, restoration of bronchial patency and morphological structure of lung tissue, activation of alveolo-capillary transport. Shown features of physical rehabilitation of this category of patients with indication of the mechanisms of therapeutic effect of physical exercises, hardware physiotherapy, natural therapeutic physical factors: koumiss, mineral waters, therapeutic mud. The developed program of the third stage of medical rehabilitation of patients who have undergone pneumonia associated with the new coronavirus infection COVID-19 in sanatoriums and polyclinics lasting 14 days. When drawing up rehabilitation programs, special attention should be paid to the intensity and timing of rehabilitation measures in elderly patients with concomitant diseases of the cardiovascular and nervous systems, obesity, and diabetes mellitus. At the same time, a personalized approach determines the choice of methods and forms of physical rehabilitation that help restore the function of external respiration, improve the activity of the cardiovascular system, and increase physical performance.

**Keywords:** therapeutic physical factors, COVID-19 coronavirus infection, pneumonia, physical rehabilitation.

The need for rehabilitation measures in patients who have undergone a new coronavirus infection is due to significant functional disorders on the part of organs and systems, the presence of complications affecting the quality of life, psychological and social status, and working capacity. The main purpose of medical

rehabilitation in this case is to return the patient to normal life, restore social status and physical performance [1].

The principles of medical rehabilitation of patients who have undergone a new coronavirus infection COVID-19 are the early onset and phasing of rehabilitation measures, their continuity, complexity and rational use of rehabilitation technology based on a personalized approach, taking into account the peculiarities of the clinical condition and the presence of comorbid pathology [1,2].

Rehabilitation measures are most effective at the II and III stages of medical rehabilitation. However, rehabilitation care should begin at an early stage when the patient reaches minimal clinical stability, taking into account indications and contraindications. Practically, the first stage of medical rehabilitation is carried out within the framework of the provision of specialized (high-tech) medical care and consists in treatment using

medications with the inclusion of rehabilitation technologies for stabilization of the condition. At the second stage, the intensity of rehabilitation measures, which are carried out in the conditions of specialized departments of medical rehabilitation of the hospital, increases. Also, the second stage of rehabilitation can be carried out in the conditions of a sanatorium-resort organization if there is a license for medical activity in stationary conditions.

It should be noted that most patients with the new COVID-19 coronavirus infection receive treatment in a polyclinic or at home. At the same time, I-II the stages of rehabilitation fall out, and medical rehabilitation is shown to them in the conditions of departments (offices) of medical rehabilitation clinics, day hospitals, as well as at home or in sanatorium-resort organizations [3].

It is known that the most common clinical manifestation of a new variant of coronavirus infection is COVID-19-associated pneumonia. The greatest number of complications occurs after severe pneumonia, which subsequently leads to the formation of pulmonary fibrosis and chronic respiratory failure, which determines the need for rehabilitation measures, their nature and volume. The ongoing rehabilitation is primarily aimed at restoring and improving the function of external respiration and the cardiovascular system, as well as at regressing pathological changes in the lungs [3,4,5].

Rehabilitation measures should be carried out on the basis of medical rehabilitation programs for each patient. The development and implementation of the rehabilitation program is carried out by a multidisciplinary team, which includes, on a minimal basis: a rehabilitologist (in physical and rehabilitation medicine), a pulmonologist, a physiotherapist, a physical therapy doctor, a clinical psychologist (psychotherapist), specialists in occupational therapy, massage, nursing staff (rehabilitation nurse), as well as according to the indications – cardiologist, neurologist, gastroenterologist. At the same time, it is necessary to take into account the presence of frequent premorbid pathology in patients with a new coronavirus infection. Taking into account the physical and functional capabilities of the patient when drawing up a rehabilitation program and its implementation is important for the subsequent intensification of physical activity in the rehabilitation process [6].

Physical rehabilitation is the main component of medical rehabilitation programs for patients with pneumonia, associated with the new coronavirus infection COVID-19, and consists of means, forms and methods of physical therapy, hardware physiotherapy, methods of spa therapy using natural therapeutic physical factors. Physical pulmonary rehabilitation is primarily aimed at preventing early and late complications, restoring bronchial patency and the morphological structure of lung tissue, activation of alveolocapillary transport. The effectiveness of rehabilitation measures is to increase tolerance to stress and hypoxia, increase the adaptive and compensatory capabilities of the body, improve the parameters of neurohumoral regulation, restore immunological reactivity with stabilization of the patient's physical and mental health. At the same time, the psychological rehabilitation aimed at reducing anxiety and depression, fear and panic, and insomnia observed in patients with coronavirus infection is an integral part of the program and is entrusted to the specialists of the rehabilitation team [2,3].

Rehabilitation measures at each stage begin with an assessment of the patient's condition, include rehabilitation measures themselves and a re-assessment of the patient's condition. The assessment is primarily functional in nature, with special attention being paid to the state of consciousness, respiratory, cardiovascular, motor functions, and quality of life parameters. Special attention should be paid to the intensity and timing of rehabilitation measures in elderly patients with obesity, diabetes mellitus, and concomitant diseases from the side cardiovascular and nervous systems, digestive organs and with complications.

A medical rehabilitation program has been developed for patients who have suffered pneumonia associated with the new coronavirus infection COVID-19, which is designed for the III stage of rehabilitation in polyclinics and sanatorium-resort organizations with a course duration of 14 days.

The effectiveness of rehabilitation technologies included in the program has been proven in scientific research on the treatment and rehabilitation of common diseases of the bronchopulmonary system.

Physical therapy, which is the main component of physical rehabilitation, is performed in the form of therapeutic gymnastics, dosed therapeutic walking, exercise training, exercises on simulators [6]. Physical exercises consist of complexes of breathing, static, dynamic, restorative exercises. The mechanism of the therapeutic effect of physical exercise, massage in lung diseases consists in their stimulating effect on the function of external respiration by increasing the mobility of the chest, increasing the air permeability of the respiratory tract and improving the evacuation function of the bronchopulmonary system. General toning exercises of a dynamic nature in combination with breathing exercises are proprioceptive regulators of the respiratory reflex. Respiratory gymnastics improves the ventilation and drainage functions of the bronchi, strengthens the respiratory muscles, abdominal muscles, improves chest mobility, promotes stretching of pleural adhesions, improves the activity of the cardiovascular system [6].

Natural therapeutic physical factors are mainly used in rehabilitation in the conditions of sanatorium-resort organizations. For respiratory diseases, the most effective are koumiss, therapeutic mud, natural steam and gas thermal springs, mineral waters for drinking treatment and balneotherapy, herbal remedies. Mare's milk koumiss is a natural therapeutic physical factor of Bashkortostan, has long been known for its effectiveness in the treatment of patients with bronchopulmonary diseases and pulmonary tuberculosis.

Due to its chemical composition, koumiss has anti-inflammatory, antioxidant, antibacterial, immunomodulatory effects, which is the basis for its use in the therapy and rehabilitation of patients with respiratory diseases, including after pneumonia associated with a new coronavirus infection. Mineral waters (drinking) of bicarbonate sulfate-magnesium composition, used in sanatoriums, contribute to the increase of nonspecific resistance of the body, and their use in the form of inhalation improves bronchial patency. Mineral baths (iodine-bromine, sodium chloride) have an adaptive, relaxing effect. Mud treatments (applications, electroplating) using sapropels in respiratory diseases have anti-inflammatory, defibrous, immunomodulatory, metabolic, reparative-regenerative, adaptogenic effects due to the content of biologically active substances in them and due to thermal, mechanical effects. Gas-thermal baths are unique an effective spa technology for restoring the function of the respiratory system after suffering from coronavirus disease, providing immunomodulatory, metabolic effects with improved bronchial patency, have a preventive value in preventing fibrous changes in the lungs.

Physiotherapeutic methods are important components of physical rehabilitation, of which the inclusion of controlled halotherapy, magnetic therapy (local and general), and laser exposure is recommended in the programs of the III stage of rehabilitation after coronavirus disease, electrophoresis and ultraphonophoresis of drugs, gas baths, inductothermy on the adrenal region according to developed methods, taking into account indications. Low-frequency magnetic therapy for respiratory diseases helps to improve local hemodynamics, vasodilation, increase the level of oxygenation and trophic tissues, increase the content of heparin in the blood and reduce platelet adhesion, stimulate the mechanisms of cellular metabolism. The main therapeutic effects of general magnetic therapy there are immunomodulatory, anti-inflammatory, analgesic, sedative, trophic reparative effects due to the development of body responses to the action of a magnetic field in the form of physico-chemical changes in the primary mechanisms of homeostasis and nonspecific adaptive reactions. Laser therapy performed by various methods (cutaneous infrared laser exposure, intravenous and intravenous laser blood irradiation) in bronchopulmonary pathology stimulates



bioenergetic and regenerative processes, has anti-inflammatory, desensitizing, immunomodulatory effects, activates the processes of micro- and lymphocirculation, regulates hemodynamics. Dry carbon dioxide baths contribute to an increase in the rate of blood flow in the microcirculatory bed, a decrease in increased platelet aggregation, an increase in shock volume and myocardial reserve, compensation for coronary insufficiency, which is especially indicated in concomitant cardiovascular pathology on against the background of coronavirus disease. Intermittent normobaric hypoxotherapy (mountain air) activates the physiological mechanisms of adaptation to hypoxia, enhances alveolar ventilation, normalizes ventilation-perfusion ratios in various parts of the lungs, has adaptive, bronchodilatory, immunomodulatory, bacteriostatic, reparative-regenerative, hemostimulating, metabolic effects [6].

As promising technologies rehabilitation for the new coronavirus infection COVID-19 can be methods that provide facilitated oxygen delivery to the alveoli, restore the surfactant layer and prevent the collapse of the alveoli. These include methods of oxygenotherapy and nitric oxide therapy.

**Conclusion.** The data available to date indicate that the effectiveness of medical rehabilitation programs for patients who have suffered from COVID-19 coronavirus infection, implemented in polyclinics and sanatorium organizations, depends on the integrated and rational use of rehabilitation technologies. At the same time, a personalized, differentiated approach, taking into account the individual characteristics of the course of the disease and the presence of comorbid pathology, determines the choice of methods and forms of physical rehabilitation – physical therapy, hardware physiotherapy of general and local effects, methods of resort medicine that helps restore the function of external respiration, improve the activity of the cardiovascular system and protective properties of the body, psychological status, the growth of physical performance.

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