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REHABILITATION OF POST-COVID-19 SYNDROME

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Abstract. The expert agreement discusses issues of comprehensive medical rehabilitation of patients with post-Covid syndrome. Coronavirus disease 2019 (COVID-19) is a contagious infectious disease that can cause respiratory, cardiac, motor, metabolic, neurocognitive and mental disorders, i.e. multiple organ dysfunction. Survivors of COVID-19, especially severe cases, face significant psychological and physical challenges, post-traumatic stress, cognitive dysfunction, nutritional deficiencies, and exacerbation of underlying chronic diseases. Some patients, regardless of the severity of the coronavirus infection, experience a prolonged course of the disease ("chronic COVID", "long COVID"). Data have emerged on the development of "post-COVID-19 syndrome." In this regard, patients who have had COVID-19 will need rehabilitation measures. The Consensus of Experts of Russian Communities presents general principles, stages and aspects of medical rehabilitation after COVID-19, indications and contraindications for rehabilitation interventions. The consensus document includes recommendations for comprehensive cardiac and respiratory rehabilitation, as well as features of rehabilitation care for different variants of the clinical course of COVID-19 within the framework of the national three-stage medical rehabilitation system.

Key words: coronavirus infection, COVID-19, SARS-CoV-2, respiratory rehabilitation, cardiac rehabilitation, cardiovascular diseases, physical exercises, breathing exercises, consensus.

COVID-19 DAN KEYINGI SINDROMNI REABILITATSIYA QILISH

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Annotasiya. Mutaxassislar kelishuvida COVID-19dan keyingi bemorlarni keng qamrovli tibbiy reabilitatsiya masalalari muhokama qilinadi. Koronavirus kasalligi 2019 (COVID-19) yuqumli yuqumli kasallik bo'lib, nafas, yurak, harakat, metabolizm, neyrokognitiv va ruhiy buzilishlar, ya'ni ko'p organ disfunksiyasini keltirib chiqarishi mumkin. COVID-19dan tirik qolganlar, ayniqsa og'ir holatlarda, katta ruhiy va jismoniy qiyinchiliklarga, posttravmatik stressga, kognitiv disfunktsiyaga, ovqatlanish yetishmovchiligiga va mavjud surunkali kasalliklarning kuchayishiga duch keladilar. Ayrim bemorlar, koronavirus infektsiyasining og'irligidan qat'iy nazar, kasallikning uzoq muddatli bosqichini boshdan kechirishadi ("surunkali COVID", "uzoq COVID"). "COVID-19dan keyingi sindrom"ning rivojlanishiga oid ma'lumotlar paydo bo'ldi. Shu munosabat bilan COVID-19ni boshdan kechirgan bemorlarga reabilitatsiya choralari kerak bo'ladi. Rossiya Hamjamiyatlarining Mutaxassislar

Konsensusi COVID-19dan keyingi tibbiy reabilitatsiyaning umumiy prinsiplari, bosqichlari va jihatlarini, reabilitatsiya aralashuvlari uchun ko‘rsatmalar va qarshi ko‘rsatmalarni taqdim etadi. Konsensus hujjati yurak va nafas reabilitatsiyasining kompleks tavsiyalari, shuningdek COVID-19ning turli klinik kechish variantlari uchun reabilitatsiya parvarishining xususiyatlarini o‘z ichiga oladi.

Kalit so‘zlar: koronavirus infektsiyasi, COVID-19, SARS-CoV-2, nafas reabilitatsiyasi, yurak reabilitatsiyasi, yurak-qon tomir kasalliklari, jismoniy mashqlar, nafas mashqlari, konsensus.

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Introduction. Coronavirus infection caused by a new strain of coronavirus SARS-CoV-2 (Severe Acute Respiratory Syndrome CoronaVirus 2) is called COVID-19 (COronaVIrus Disease 2019) [1]. COVID-19 is an acute respiratory disease with primary damage to the upper and lower respiratory tract of varying severity from asymptomatic carriage to a clinically severe form of viral pneumonia with the development of acute respiratory failure (ARF), acute respiratory distress syndrome (ARDS), and at a late stage — sepsis and septic (infectious-toxic) shock [2]. Despite its tropism for lung tissue, the SARS-CoV-2 virus attacks various organs/systems of the human body, leading to the development of cardiovascular, coagulopathic, renal, gastrointestinal, hepatic, metabolic, motor, neurocognitive and mental disorders, i.e. multiple organ failure.

The global pandemic of the new coronavirus infection has identified new challenges for the medical community. Functional disorders of vital body systems in patients with COVID-19 after the elimination of an acute infectious and inflammatory process can persist for a long time in the form of post-COVID-19 syndrome [3], and prolonged lack of physical activity can lead to a significant decrease in physical tolerance. Functional disorders of vital body systems in patients with COVID-19 after the elimination of an acute infectious and inflammatory process can persist for a long time in the form of post-COVID-19 syndrome [3], and prolonged lack of physical activity can lead to a significant decrease in physical tolerance.

To date, the world is just beginning to accumulate a database and professional information on medical rehabilitation of patients with COVID-19. Questions remain open: what rehabilitation measures are required for patients who have had COVID-19? Which patients need rehabilitation? While the degree of influence of COVID-19 on the training process is not completely clear, the level of safety of specialized physical training programs also requires clarification. In this regard, when preparing the consensus document, the putative pathogenetic mechanisms of development, clinical characteristics and features of the course of COVID-19 were taken into account.

Post-COVID-19 syndrome

The time for the elimination of clinical symptoms of COVID-19 and the restoration of impaired functions in patients varies; it depends on the clinical course and complications of the new coronavirus infection, as well as on the patient’s health status before encountering this infection. In some patients, complaints and symptoms of COVID-19 may persist or even appear after acute phases of the disease – in the period from 4 to 12 weeks, which may indicate a prolonged course of the disease (the term “chronic-COVID”, “long COVID” is proposed for description) [4,5,11]. However, many patients may not realize that their symptoms are associated with a persistent form of COVID-19 (due to the persistence of the virus).

The presence of post-COVID-19 syndrome has been reported – the persistence of symptoms after infection for 12 weeks or more, which cannot be explained by alternative

diagnoses [3,4,6,12]. An analysis by the Committee for National Statistics in England (n=186 thousand) revealed symptoms of coronavirus infection after 5 weeks in 1 out of 5 patients and after 12 weeks or more in 1 out of 10 [7,13].

Typically, patients complained of weakness, fatigue, temperature changes (sharp decrease and increase), sweating, myalgia, joint pain, chest pain, drowsiness, headache, dizziness, cognitive impairment (decreased attention and memory, poor sleep), loss taste sensations or a sharp exacerbation of the sense of smell, psychoemotional disorders (depression and anxiety), dysfunction of the gastrointestinal tract (decreased appetite, nausea, constipation, alternating diarrhe

They did not tolerate physical activity well, against the background of which a rapid drop in SpO2 levels was observed, tachycardia/arrhythmia, shortness of breath, cough and chest pain developed, and blood pressure (BP) levels fluctuated from hypotension to the development of a hypertensive crisis [3,4–7].

The symptoms listed above can also appear in patients who have had a mild form of coronavirus infection and significantly reduce their quality of life [8]. This indicates the importance of involving all patients (regardless of the severity of COVID-19 and hospitalization) in multidisciplinary rehabilitation programs and monitoring their condition after discharge.

Expert consensus agreement on a number of provisions that must be taken into account at the stage of initiating medical rehabilitation of patients with COVID-19:

• In the acute phase of COVID-19, along with disorders of the respiratory system, the risk of developing other complications (including cardiovascular, hepatic, renal, hematological and gastrointestinal) increases, which (directly or indirectly) can limit rehabilitation measures (reduce rehabilitation potential of the patient to a very low level).

• Pathological and functional impairments of varying severity can occur with any form of COVID-19; In patients with severe/extremely severe forms of COVID-19, negative changes due to the consequences of intensive care and ICU stay are most noticeable.

• Functional disorders of the vital systems of the body can persist for a long time after the elimination of an acute infectious-inflammatory process and the resolution of viral pneumonia; symptoms of post-COVID-19 syndrome can appear after any course of coronavirus infection, including in patients who have had a mild form of it.

• Consequences of PIT syndrome, multiple organ failure and other complications of COVID-19, prolonged immobilization, concomitant chronic diseases (CVD, cerebrovascular diseases, COPD), multimorbidity and old age slow down the rate of functional recovery of the patient and require longer rehabilitation.

• Diffuse alveolar lung damage of varying degrees develops in all variants of the course of COVID-19; even with erased and mild forms of the disease, there are undiagnosed changes in the lungs at the level of small bronchi and alveoli, although minimal.

• Pathological processes in the lung tissue caused by the SARS-CoV-2 virus lead to serious impairment of lung function of a restrictive type, decreased compliance of the lung tissue and dysfunction of the respiratory muscles (primarily inspiratory muscles); in most cases, a dry, non-productive cough is observed, which is important to consider when choosing respiratory rehabilitation techniques.

• Patients with persistent shortness of breath and/or low SpO2 at rest and/or during mobilization (passive, passive-active and active) and physical activity require special care and constant access to oxygen therapy during the rehabilitation process; such patients may be considered at increased risk of long-term consequences of exposure to the SARS-CoV-2 virus associated with respiratory failure and will require longer rehabilitation and careful monitoring of their condition.

• In all patients with COVID-19, including moderate and even mild forms of the disease, it is necessary to conduct an initial assessment and monitoring of the cardiovascular system.

• Symptoms of CVD can occur at any time during a patient's hospitalization, but, as a rule, their risk increases 15 days or more after the onset of fever (or other symptoms of a viral infection); CVS often develops after stabilization and/or even improvement of the patient's respiratory status

• Adverse cognitive and psychological consequences of COVID-19 appear at different stages of the disease and during convalescence, which requires early screening of cognitive dysfunction and assessment of the patient's psychological status.

General principles of medical rehabilitation of patients with COVID-19

At the present stage, there are no highly reliable results of using medical rehabilitation programs for COVID-19. But evidence of the high effectiveness of well-known rehabilitation methods used in pulmonology and cardiology, and certain experience gained in the context of previous infections, suggests a beneficial effect of newly tested rehabilitation technologies on the outcomes of the new coronavirus disease. The Consensus Document defines the features of rehabilitation care in the acute and subacute periods of the disease. In the later stages of the disease, provided there is no contagiousness, rehabilitation measures can be implemented within the framework of the basic principles of cardiac and respiratory rehabilitation, but taking into account the special consequences of exposure to the SARS-CoV-2 virus.

Objectives of medical rehabilitation after COVID-19:

• restoration of external respiration function: improvement of lung perfusion, gas exchange and bronchial clearance (according to indications), reduction in the severity of shortness of breath;

• leveling or minimizing the consequences of the patient's stay in the ICU and aggressive treatment (secondary effect of forced immobilization, PIT syndrome, PMCS, post-intubation dysphagia, joint stiffness and contracture, balance and equilibrium disorders);

• restoration of cardiovascular system and maintaining stability of hemodynamic parameters;

• prevention of cardiovascular complications, thrombosis and thromboembolism;

• prevention of complications of hypokinesia: restoration of muscle mass, muscle strength (including respiratory muscles) and FRS, increasing mobility and daily physical activity of the patient;

• providing adequate and balanced nutrition, nutritional support;

• normalization of psychological status, maintaining psycho-emotional stability, increasing psychological stability, overcoming stress, anxiety, depression;

• correction of sleep disorders, improvement of cognitive status;

• increasing the body's immunity and resistance;

• changing the patient's lifestyle, modifying cardiovascular risk factors and risk factors for chronic lung diseases, informing the patient about the disease, methods of treatment, prevention and rehabilitation; teaching the patient self-monitoring of the condition, self-help methods, bronchial clearance (on demand), independent

breathing exercises, as well as aerobic training at home;

• improving the patient's quality of life and returning him to society;

• secondary prevention of complications and post-viral syndrome with chronic fatigue.

Key principles of medical rehabilitation of patients with COVID-19: phasing (routing of patients within a three-stage rehabilitation system), individuality (focus on the needs, goals and desires of a particular patient), multidisciplinarity (involving a multidisciplinary team), validity, continuity, accessibility.

Features of organizing rehabilitation for COVID-19:

• rehabilitation accompanies the treatment process, begins early (after completion of the acute phase of COVID-19), but no later than 48–72 hours from the development of the disease, taking into account risk factors, rehabilitation potential and contraindications to certain methods of rehabilitation;

• for the purpose of safety and achieving a better effect from rehabilitation, it is necessary to identify potentially significant factors in the severe form of COVID-19, take into account concomitant diseases and comorbidities that reduce the patient's rehabilitation potential and the possibility of his involvement in the rehabilitation program;

• make extensive use of supervised remote rehabilitation methods (telerehabilitation), educational videos, brochures, and remote consultation to prevent cross-infection between patients and infection of medical staff;

• comply with anti-epidemic requirements, provide medical personnel with appropriate personal protective equipment, separate rehabilitation equipment for infected and non-infected people, ensuring its sanitization; any rehabilitation procedure – this is a high risk of transmission of infection (the SARS-CoV-2 virus is classified as level 2 of pathogenicity); during procedures, patients can emit an aerosol with the virus and remain contagious even during the period of convalescence [9,10]. Based on currently known ideas about the pathogenesis of organ damage associated with SARS-CoV-2, certain requirements are put forward for rehabilitation programs and interventions for COVID-19.

Conclusion.

COVID-19 is an emerging infectious disease that has been spreading since late 2019. Evidence is accumulating on the effectiveness of rehabilitation interventions for COVID-19.

The emerging consensuses of various foreign communities are mainly based on the own experience of experts working in the field of medical rehabilitation, take into account the national characteristics of the organization of rehabilitation in their own country, relate, as a rule, to the first stage of rehabilitation and are concentrated only on the principles of respiratory rehabilitation (but there is no consensus in choosing the most appropriate respiratory rehabilitation techniques). The issue of rehabilitation of patients with COVID-19, in whom the course of the disease is complicated by concomitant cardiovascular pathology, is not considered. To prepare an initial consensus statement on a three-step process for medical rehabilitation of patients with COVID-19, including those with concomitant CVD.

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