

PREVENTION AND REHABILITATION OF CHILDREN AFTER CORONAVIRUS INFECTION

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ABSTRACT

The purpose of the study is to analyze literature data on the prevention and rehabilitation of children after a coronavirus infection. All patients need medical rehabilitation, including those who have had the disease in an asymptomatic or mild form. The main principles and stages of medical rehabilitation of these patients are determined, indications for various stages are substantiated. Medical rehabilitation of children after a new coronavirus infection at all stages is carried out by specialists of a multidisciplinary rehabilitation team, which includes: a pediatrician, a physiotherapist, an exercise therapy doctor, a medical rehabilitation doctor, a reflexologist, a medical psychologist, a speech therapist, and an instructor-methodologist. Data on the possibility of functional impairment not only of the respiratory organs, but also of other body systems determine the need for staged medical rehabilitation of such children.

The study of the mechanisms of the pathogenesis of COVID-19 development, including in terms of laboratory markers, contributes to the accumulation of new knowledge and makes it possible to develop approaches to the complex treatment of new and prevention of life-threatening complications. There is a small amount of information on the prevention and rehabilitation of children in the available literature [7,8]. The main provisions are set out in the "Temporary Guidelines ...", which are based on materials on the medical rehabilitation of patients with COVID -19 at various stages of specialized medical care, published by experts from the World Health Organization, an analysis of reports from clinics involved in the rehabilitation of patients with COVID -19 in this moment, as well as on the results of clinical studies conducted earlier and devoted to the rehabilitation of patients with the syndrome of the consequences of intensive care and ARDS [1,3,7].

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The purpose of the study is to analyze literature data on the prevention and rehabilitation of children after a coronavirus infection.

The experience of monitoring children who have had a new coronavirus infection has shown that all patients need medical rehabilitation, including those who have had the disease in an asymptomatic or mild form. Data on the possibility of functional impairment not only of the respiratory organs, but also of other body systems determine the need for staged medical rehabilitation of such children.

The article defines the basic principles and stages of medical rehabilitation of these patients, substantiates the indications for various stages [3,4,8,9]. Medical rehabilitation of children after a new coronavirus infection at all stages is carried out by specialists of a multidisciplinary rehabilitation team, which includes: a pediatrician, a physiotherapist, an exercise therapy doctor, a medical rehabilitation doctor, a reflexologist, a medical psychologist, a speech therapist, and an instructor-methodologist.

We have studied a wide range of modern technologies of apparatus physiotherapy and kinesitherapy, shown to children who have had COVID-19, with a description of the main therapeutic effects and the mechanism of the

therapeutic action of physical factors [5,6,7,10]. Psychological rehabilitation is of great importance in the complex of rehabilitation measures for children with COVID-19. Particular attention is paid to the issues of sanatorium treatment of children after a new coronavirus infection. A range of non-drug technologies has been determined to be included in the individual program of sanatorium-and-spa treatment of such patients using natural healing resources (mineral waters, therapeutic mud, therapeutic climate, other natural conditions used for the treatment and prevention of diseases); non-drug therapy, exercise therapy, massage, physiotherapy, hydrotherapy, reflexology, psychotherapy. The article presents the criteria for evaluating the effectiveness of rehabilitation measures [7,8,10].

Data of Petrova M.S., Khan M.A. (2021), are devoted to current information on the epidemiology and clinical course of this disease in children [7,8,9,10], medical rehabilitation of children who have had a coronavirus infection COVID-19, which is an acute infectious disease caused by a new strain of a virus from the genus coronaviruses SARS CoV-2. It is known that in children, complications and adverse outcomes of COVID-19 are observed much less frequently than in adults; however, the experience of monitoring children who have had a new coronavirus

infection has shown that all patients need medical rehabilitation, including those who have had the disease in asymptomatic or mild. Data on the possibility of functional impairment not only of the respiratory organs, but also of other body systems determine the need for staged medical rehabilitation of such children. The authors defined the basic principles and stages of medical rehabilitation of these patients, substantiated indications for various stages [4,6,7,8].

Specialists of the multidisciplinary rehabilitation team draw up an individual program of medical rehabilitation, determine the goals and objectives of the rehabilitation course, decide on admission to physical activity, taking into account the functional state of the child's body, indicate the range of medicinal and non-drug technologies and the scope of rehabilitation measures. In the rehabilitation process, the methods of physiotherapy, balneo-peloid therapy, physiotherapy, reflexology, manual therapy, psychotherapy are widely used [3,4,5,8,9]. In an analysis of pediatric patients in China, pneumonia in combination with fever or cough was noted in 30% of children, in 22% pneumonia was the only manifestation of infection. The phenomena of hypoxia were observed less frequently, but in some cases there was a decrease in saturation below 93% or 94% [14]. According to the guidelines "Peculiarities of clinical manifestations and treatment of a disease caused by a new coronavirus infection (COVID-19) in children, version 1, clinical manifestations of lung damage in the form of dyspnea during exercise (crying / crying), as well as a decrease in blood saturation ($SpO_2 \leq 95\%$) occur already at moderate severity of the disease.

Severe COVID-19 may present with dyspnea (feeling short of breath, chest tightness, shortness of breath or tachypnea), cyanosis/acrocyanosis, $SpO_2 \leq 93\%$

Rehabilitation measures are recommended to start already at the first stage of medical rehabilitation in the inpatient infectious diseases department, according to indications in the ICU, where children with COVID 19 are sent [13]. The task of rehabilitation of patients who survived after COVID-19 is to restore the function of external respiration, transport and utilization of oxygen by working tissues / organs, reduce the severity of dyspnea, maintain the cardiovascular system and reduce the risk of cardiovascular events, restore muscle strength, physical performance and daily activity, improve quality of life and psychological status of the patient, his return to society (society).

There are several aspects of the rehabilitation of patients with COVID-19: medical, physical, educational and psychological. The medical aspect consists of examination, assessment of the patient's clinical condition, identification and correction of traditional cardiovascular risk factors, appropriate drug therapy [7,8,10]. The psychological aspect of rehabilitation is associated with the need for psychological adaptation of the patient to the disease, increasing his resistance to stressful situations, and, if necessary, treating anxiety and depressive disorders. Psychological assistance is provided to all patients with coronavirus infection starting from the first stage of rehabilitation.

Patients with high levels of anxiety and anxiety disorders need to be identified early.

As part of physical rehabilitation, breathing exercises are distinguished (static, dynamic breathing exercises, starting from stage II - inspiratory training using breathing simulators), general strengthening exercises involving small / medium muscle groups, muscle relaxation exercises, resistive / strength and dynamic exercises / training .

At the ICU stage, positional therapy is used (including prone position - the prone position in patients with ARDS and severe respiratory failure to optimize oxygenation), postural correction, early mobilization of the patient (passive, partially passive and active movements in all joints) and verticalization [fifteen]. Initially, emphasis is placed on training the muscles that are the most weakened and functionally significant to ensure the vertical position and locomotion of the patient.

Children and adolescents are vulnerable to the development of post-traumatic stress syndrome. Psychopathological changes in children with pneumonia associated with a new coronavirus infection are represented by psychogenic neurotic reactions to the very fact of somatic suffering, as well as neurosis-like disorders, mainly in the form of asthenic conditions and depressive spectrum disorders. They are divided into anxious, anxious-depressive, anxious-hypochondriac, hysteroid-depressive states. Psychological counseling is essential for a speedy recovery. For older children, especially those with manifestations of phobias, anxiety, psychological disorders, active psychological support and treatment are indicated. Apply methods of complex cognitive-oriented psychotherapy using parallel-sequential components: psychoeducational; cognitive-causal-oriented, hypno-therapeutic. Decreased physical activity of children in the hospital, including those in the intensive care unit, as well as catabolic changes, especially in skeletal muscles, a decrease in food intake, subsequently reduce the effectiveness of rehabilitation measures. Nutritional support is an independent factor that improves treatment outcomes, short-term and long-term prognosis, and reduces the incidence of complications. The European Society for Clinical Nutrition and Metabolism (ESPEN) has recommended an algorithm for assessing nutritional levels. Followed by determination of the degree of nutritional status disorders in adult patients with COVID-19, including screening for malnutrition, optimization of nutritional status, use of vitamin and mineral supplements, regular physical activity, additional oral nutrition (sipping), enteral nutrition [11].

When choosing a specific rehabilitation method and forming a rehabilitation complex, it is rational to combine nosological and syndromic-pathogenetic approaches that allow individualizing the rehabilitation process. Necessary conditions for effective rehabilitation: provision of modern equipment, qualified personnel, compliance of the methods used with clinical recommendations based on evidence, a system for assessing the quality of medical care. Italian authors [12] studied the impact of blocking rehabilitation services related to COVID-19. These results highlight the burden faced by individuals on the mental health of those caring for children with neurodevelopmental disabilities. caring for children with neurodevelopmental disorders during the COVID-19 emergency in Italy [4,5,6,7]. These families should be considered as a high-risk group that requires special attention from healthcare, such as promoting continuity of care by investing in tele-rehabilitation programs.

Caregivers of children with disabilities have reported symptoms of anxiety and depression during the COVID-19 emergency. The main concerns related to the risk of contracting COVID-19 and the development of the child during the rehabilitation lockdown.

The psychological symptoms of the caregivers have been linked to concerns about the child's development during the lockdown. Parents of children with disabilities may face appropriate stress during and after the psychological stress of COVID-19. During recovery from COVID-19, policymakers and clinicians should dedicate specific actions to caring for the families of children with disabilities. Seventy-one children with NDD were enrolled in this study and were followed up in the Pediatric Neuropsychiatry Department of the Polyclinic of the University Hospital Consortium Corporation in Bari, Italy, along with their parents. The parents were assessed prior to the national lockdown (baseline) and re-contacted during the SARS-CoV-2 emergency nearly a year later. Changes in children's emotional/behavioral problems and parental stress before and during the SARS-CoV-2 pandemic were assessed using the Child Behavior Checklist (CBCL) and the Parent Stress Index - Short Form (PSI). A group of authors [Firsin S.A. et al. 2020] A model of adaptive games "GTO-NIKA" was developed, which could encourage students to participate in physical culture and recreation activities, form their steady interest in systematic physical exercises with a focus on a healthy lifestyle in the context of the spread of a new coronavirus infection [7,8,9,10]. The program of adaptive games includes creative and sports competitions, consisting of special exercises, tasks that allow you to assess each participant's health status, level of physical fitness, to realize the features and capabilities of the physique, to show creative abilities that contribute to maintaining health and promoting a healthy lifestyle. Based on the data obtained, it can be assumed that the GTO-NIKA adaptive games in the context of the spread of a new coronavirus infection showed the important role of physical culture in maintaining health, as well as in shaping the motivation to lead a healthy lifestyle.

The main role and significance of the GTO-NIKA adaptive games is to adapt children and young people to the new reality with the help of play activities, to motivate them to maintain their health and lead a healthy lifestyle.

Since the start of the covid-19 pandemic, efforts have been made to provide acquired immunity against Covid-19. Prior to the production and authorization of Covid-19 vaccines, knowledge about the structure and function of coronaviruses was established, which accelerated the ability to produce vaccines.

Following the sharing of genetic sequencing data and the global pharmaceutical industry's core commitment to fighting COVID-19, vaccine production has begun. The high efficacy of various COVID-19 vaccines in preventing symptomatic COVID-19 infections has been found in large-scale phase III trials (3). The author reviews the development of vaccines against SARS-CoV-2. Development began when the genetic sequence of the virus became available in early January 2020 and has moved at an unprecedented pace: the Phase I trial began in March 2020, with more than 180 vaccines currently in various stages of development.

Data from phase I and phase II trials are already available for several vaccine candidates, and many have moved on to phase III trials. Evidence to date suggests that effective and safe vaccines could be available within months rather than years.

Several steps have been evaluated throughout the development path of these vaccines, including the safety and acceptable toxicity of the vaccine, the duration of protective immunity, the stability characteristics of each vaccine, thermal stability and storage conditions outside the required temperature range, delivery system such as injectable, oral and nasal, dosing schedules vaccines against COVID-19 (single dose or multiple divided doses), and likely side effects of the vaccines. At the same time, the development and implementation of new test systems has been intensified, new antiviral pharmacological agents and vaccines are being studied.

CONCLUSIONS:

1. Data on the possibility of violation of the functional state of not only the respiratory organs, but also other body systems determine the need for an in-depth study of the hormonal status of the body for effective staged medical rehabilitation of such children.
2. When choosing a specific rehabilitation method and forming a rehabilitation complex, it is rational to combine nosological and syndromic-pathogenetic approaches that allow individualizing the rehabilitation process.
3. The development of effective means of preventing COVID-19 in children remains the main hope of the medical community in the fight against a new coronavirus infection.

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