

Review

UDC: 616-006:614.215

DOI: <https://doi.org/10.38025/2078-1962-2023-22-5-98-109>

## Medical Rehabilitation and Sanatorium Treatment of Patients after Medical Care in The Field of Oncology: a Review

Arkady N. Daykhes<sup>1</sup>, Alexey V. Shulaev<sup>2,\*</sup>, Natalya V. Machula<sup>1</sup>, Alexandra M. Stepanova<sup>3</sup>, Anfisa M. Nikitina<sup>1</sup>, Elena V. Gameeva<sup>3</sup>, Vladimir N. Yuschuk<sup>4</sup>, Anastasia A. Shikaleva<sup>2</sup>

<sup>1</sup> Federal Scientific and Clinical Center for Medical Rehabilitation and Balneology, Moscow, Russia

<sup>2</sup> Kazan State Medical University, Kazan, Russia

<sup>3</sup> P.A. Herzen Moscow Research Institute of Oncology, a branch of the National Medical Research Center of Radiology, Moscow, Russia

<sup>4</sup> Tver State Medical University, Tver, Russia

### ABSTRACT

**INTRODUCTION.** Physical therapy, natural healing resources, spa treatment technologies and other medical rehabilitation reduce the negative effects of treatment-related symptoms and improve the physical function of patients with cancer. Despite a growing body of evidence and recommendations to better integrate medical rehabilitation into cancer care, rehabilitation is a relatively underutilized service.

**AIM.** To summarize the available Russian studies on the use of medical rehabilitation and spa treatment in patients after care, in the field of oncology.

**MATERIALS AND METHODS.** Analysis of the published scientific literature. Meta-analyses, systematic reviews, cohort, prospective and controlled studies for the period from 2014 to 2022 were selected for consideration.

**RESULTS.** Treatment of a cancer patient should not only focus on eliminating the disease directly and restoring the physical functions of the body, but also on restoring the person's ability to live as acceptably as possible in and after the disease. Medical rehabilitation is carried out by the efforts of various specialists in a multidisciplinary team, and their work should consider the peculiarities of the course of the underlying disease, the condition of the cancer patient and his/her (the patient's) individual characteristics.

**CONCLUSION.** Improving rehabilitation care in accordance with the recommendations can have a significant impact on the functioning and quality of life of cancer patients.

**KEYWORDS:** rehabilitation, oncology, physical therapy, health resort, magnetic therapy, climate therapy, massage, balneotherapy, breast cancer, prostate cancer, colorectal cancer.

**For citation:** Daykhes A.N., Shulaev A.V., Machula N.V., Stepanova A.M., Nikitina A.M., Gameeva E.V., Yuschuk V.N., Shikaleva A.A. Medical Rehabilitation and Sanatorium Treatment of Patients after Medical Care in The Field of Oncology: a Review. Bulletin of Rehabilitation Medicine. 2023; 22(5): 98-109. <https://doi.org/10.38025/2078-1962-2023-22-5-98-109>

\* **For correspondence:** Alexey V. Shulaev, E-mail: [alexs\\_shu@mail.ru](mailto:alexs_shu@mail.ru)

**Received:** 02.08.2023

**Accepted:** 29.09.2023

**Published:** 17.10.2023

# Медицинская реабилитация и санаторно-курортное лечение пациентов после оказания медицинской помощи по профилю онкология. Обзор

Дайхес А.Н.<sup>1</sup>, Шулаев А.В.<sup>2,\*</sup>, Мачула Н.В.<sup>1</sup>, Степанова А.М.<sup>3</sup>, Никитина А.М.<sup>1</sup>,  
Гамеева Е.В.<sup>3</sup>, Ющук В.Н.<sup>4</sup>, Шикалева А.А.<sup>2</sup>

<sup>1</sup> ФГБУ «Федеральный научно-клинический центр медицинской реабилитации и курортологии» ФМБА России, Москва, Россия

<sup>2</sup> ФГБОУ ВО «Казанский ГМУ» Минздрава России, Казань, Россия

<sup>3</sup> МНИОИ им. П.А. Герцена — филиал ФГБУ «НМИЦ радиологии» Минздрава России, Москва, Россия

<sup>4</sup> ФГБОУ ВО «Тверской государственный медицинский университет» Минздрава России, Тверь, Россия

## РЕЗЮМЕ

**ВВЕДЕНИЕ.** Лечебная физкультура, физиотерапия, природные лечебные ресурсы и другие технологии медицинской реабилитации и санаторно-курортного лечения уменьшают негативное влияние симптомов, связанных с лечением, и улучшают физические функции пациентов, страдающих онкологическими заболеваниями. Несмотря на растущее количество доказательств и рекомендаций по лучшей интеграции медицинской реабилитации в оказание онкологической помощи, реабилитация является относительно малоиспользуемой услугой.

**ЦЕЛЬ.** Обобщить имеющиеся российские исследования по применению медицинской реабилитации и санаторно-курортного лечения пациентов после оказания помощи по профилю онкология.

**МАТЕРИАЛ И МЕТОДЫ.** Анализ опубликованной научной литературы. Для рассмотрения произведен отбор мета-анализов, систематических обзоров, когортных, проспективных и контролируемых исследований за период с 2014 по 2022 годы.

**РЕЗУЛЬТАТЫ.** Лечение онкологического пациента должно быть направлено не только на устранение непосредственно болезни и восстановление физических функций организма, но и на максимально приемлемое восстановление способности человека жить в условиях заболевания и после него. Медицинская реабилитация осуществляется усилиями различных специалистов из мультидисциплинарной бригады, которым в своей работе необходимо учитывать особенности течения основного заболевания, состояние онкологического пациента и особенности его личности.

**ЗАКЛЮЧЕНИЕ.** Улучшение реабилитационной помощи в соответствии с рекомендациями может оказать существенное влияние на функционирование и качество жизни пациентов по профилю онкология.

**КЛЮЧЕВЫЕ СЛОВА:** реабилитация, онкология, физиотерапия, санаторий, магнитотерапия, климатотерапия, массаж, бальнеотерапия, рак молочной железы, рак предстательной железы, колоректальный рак.

**Для цитирования:** Daykhes A.N., Shulaev A.V., Machula N.V., Stepanova A.M., Nikitina A.M., Gameeva E.V., Yuschuk V.N., Shikaleva A.A. Medical Rehabilitation and Sanatorium Treatment of Patients after Medical Care in The Field of Oncology: a Review. Bulletin of Rehabilitation Medicine. 2023; 22(5): 98-109. <https://doi.org/10.38025/2078-1962-2023-22-5-98-109>

\* **Для корреспонденции:** Шулаев Алексей Владимирович, E-mail: alexs\_shu@mail.ru

Статья получена: 02.08.2023  
Статья принята к печати: 29.09.2023  
Статья опубликована: 17.10.2023

## INTRODUCTION

Patients receiving combined treatment for malignant neoplasms (MNT) have impaired physical and cognitive functions, which generally negatively affect a person's life activity, his (the ir) position in society, and largely reduces survival rates.

The integrated use of physical therapy, physiotherapy, natural healing resources and other technologies of medical rehabilitation and sanatorium-resort treatment significantly reduces the negative impact of symptoms associated with the treatment of cancer and its consequences, improves a person's physical functions and quality of life in general. Despite the growing number of foreign studies devoted to medical rehabilitation of cancer patients, there are not many similar studies in our country today, which underpins the need for a large-scale research into this problem.

## AIM

To summarize the available Russian data on the use of medical rehabilitation and sanatorium-resort treatment of patients after medical care in the field of oncology.

## MATERIALS AND METHODS

An analysis of the published scientific literature was carried out using keywords: medical rehabilitation, spa treatment, oncology. Meta-analyses, systematic reviews, cohort, prospective and controlled studies between 2014 and 2022 were selected for review.

## RESULTS

### *Principles of Rehabilitation for Cancer Patients*

According to order of the Ministry of Health of the Russian Federation dated July 31, 2020 No. 788н «On approval of the

Procedure for organizing medical rehabilitation of adults,» today a new strategy for providing medical care for medical rehabilitation to patients of all nosologies, including patients with cancer, is being introduced in our country. More and more works are devoted to this issue. One of the largest of them is a study conducted by D.V. Kovlen, in which, for the first time in Russia, the main approaches to the development of clinical recommendations for physical and rehabilitation medicine, including rehabilitation after cancer treatment, were identified. The author notes that the most commonly reported problems after cancer treatment are physical (such as pain and fatigue) and psychosocial problems (such as fear of relapse). Patients after combined treatment of cancer also have an increased risk of developing concomitant pathologies. According to the author, medical rehabilitation of cancer patients should be aimed at eliminating physical and psychological impairments to maintain or restore function, reduce the severity of symptoms, maximize independence and improve quality of life [1]. In addition, the author draws attention to the fact that physical activity is an important component of rehabilitation measures for cancer patients. To date, interdisciplinary oncology rehabilitation programs have been implemented, based on physical exercises and complemented by interdisciplinary education and lifestyle counseling for patients with cancer.

The paper by M.F. Balluzek et al. assessed the effectiveness of organizing medical rehabilitation programs for cancer patients based on an interdisciplinary approach, which is fully in line with current trends worldwide. The authors analyzed 845 cases of hospitalization of cancer patients in a multidisciplinary clinic for the purposes of oncological rehabilitation at the stages of specialized treatment for the correction of complications, diagnosis and treatment of comorbid diseases, or for palliative care. Low commitment of oncologists to refer patients to multidisciplinary hospitals for programs of supportive overall somatic treatment involving multidisciplinary rehabilitation teams, especially at the initial stages of cancer, has been found; in 94.1 % of the cases, on the recommendation from oncologists of specialized institutions, patients were admitted only at an advanced stage of the tumor process. At the same time, 64.8 % of patients admitted only for the purpose of palliative care were able to continue combined treatment. Among the patients referred for palliative care, in 4.9 % of cases the severity of their condition was mistakenly assessed as a relapse of cancer, whereas it was due to comorbid pathology. At the same time, the low interest of cancer patients themselves in rehabilitation measures was noted in cases of lack of recommendations from their treating oncologists. It has been shown that not only patients with advanced manifestations of the malignant process, but also patients with stages I–II of cancer need maintenance therapy based on the principles of an interdisciplinary approach [2].

The need for an integrated approach to medical rehabilitation of cancer patients is reflected in literature reviews conducted in the Russian Federation. Thus, Stepanova A.M. et al. considered the issues of complex restorative treatment in oncology. The authors note that restorative treatment in oncology is one of the rapidly developing areas of medicine. A fully-fledged, personalized and comprehensive medical rehabilitation helps to significantly reduce the number of complications and improve the

quality of life of patients with cancer. The main principles of rehabilitation treatment for cancer patients are the early start of medical rehabilitation, continuity at all stages of combined treatment, continuity, comprehensive nature, including physical, psychological, social rehabilitation, etc., phasing and an individual approach to treatment and restoration of lost functions. In the complex medical rehabilitation of cancer patients, the combined use of such methods as: mechanotherapy, exercise therapy, aerobic exercise, early mobilization (activation and verticalization) of patients from 1–2 days after surgery, massage, physiotherapy (low-frequency magnetic therapy, low-intensity laser therapy, electrotherapy, inhalation therapy, deep oscillation) and psychotherapy is considered. As part of psychological rehabilitation, the authors study methods of psychological influence: person-oriented, suggestive, behavioral, cognitive, art therapy, creative visualization, which are intended for both individual and group psychological work [3]. This is confirmed in a later review by the authors, which focuses on the technologies used for medical rehabilitation of patients with cancer, used throughout the world [4].

### **Physical Rehabilitation Techniques**

The review by Kasparov B.S. et al. features a scientometric analysis of evidence-based studies of physical factors in the rehabilitation of patients with breast cancer (BC). An analysis of publications that had been made before 2018 showed that physical exercises for patients with breast cancer are reliably indicated both in the neoadjuvant preoperative period and in the adjuvant stage, including radiation and drug therapy. Physical activity is effective both at home and in the form of exercise therapy in a medical facility. Aquatic exercises as one of the options for hydro-kinesiotherapy is recommended both for patients with early forms and metastatic breast cancer. The effectiveness of low-intensity laser therapy, low-frequency low-intensity electrotherapy, lymphatic drainage massage, acupuncture, acupressure, and electroacupuncture has been proven in a number of studies, but requires clarification. In addition, according to the analysis, the ineffectiveness and/or harm of using kinesio taping and ultrasound therapy has been proven. Also, according to the results of the analysis, regarding the use of phototherapy, normobaric hypoxic therapy, transcranial electrical neurostimulation, magnetic therapy, their quality is low, or studies have not been conducted (the technique is recommended based on the consensus of experts) [5].

Today, physical rehabilitation is given priority among cancer patients all over the world. Numerous studies on this issue have been published in our country.

Chechel'nitskaya S.M. et al. consider personalized physical rehabilitation of children after treatment for various oncological diseases. The feasibility and effectiveness of partner medicine programs conducted in part-time and part-time mode in the medical rehabilitation of children with cancer have been studied. The authors developed a personal program of physical rehabilitation, which was carried out in a cyclical mode: a hospital period for examination, development of a personal program and training in implementation (2 weeks), an interhospital period of independent training with remote support from a doctor and exercise therapy methodologists (from 6 to 12 months). The effectiveness of the developed model was assessed

using three criteria: parents' satisfaction with participation in the program (questionnaire), adherence to recommended physical activity (questionnaire) and assessment of basic mobility (Terrencourt test). The rehabilitation protocol was tested in 135 children 6–18 years old with hematological malignancies, brain tumors, solid tumors, malignant tumors of bones and skeletal muscles. According to the data obtained, participation in the program increased the parents' confidence in their own ability to help their child with physical exercises at home and formed their willingness to continue the course at home. As a result of the study, the feasibility and desirability of partnership interaction with a team of specialists for the patients' parents was confirmed [6].

The paper by Sidorenko L.V. et al. examined complex physical activity as an effective method of rehabilitation of patients cured of various malignant neoplasms (MNT). During the training process, each participant developed an individual style — a stable individual-specific system of psychological means, techniques, skills, methods, and ways of engaging in sports activities [7].

The article by Terentiyev F.V. and Mainazarova E.S. discusses the possibility of using the means of adaptive physical culture in the process of medical rehabilitation of adolescents with oncological hematological diseases and demonstrates the importance of the socializing and pedagogical orientation of adaptive physical culture in the process of rehabilitation activities for adolescents after hematopoietic stem cell transplantation. During the work, indicators of their physical condition were assessed at different stages of the study. The analysis showed a decrease in all studied scales at the second stage, which was due to the transplantation of hematopoietic stem cells and their approach to the initial level at the third stage, while the indicators of the physical condition of adolescents using adaptive physical exercises were higher than those of adolescents without exercises on all the scales under study [8].

The research paper by Rud I.M., dealing with stabilization training in the rehabilitation of patients with postural instability of various origins, points out that in order to draw up an individual plan for medical rehabilitation, patients with postural instability due to diseases of the musculoskeletal system, consequences of injuries, including after endoprosthetics of the joints of the lower extremities, should be divided into groups in accordance with the rehabilitation potential regarding the restoration of postural function, according to the developed algorithms [9]. The author draws attention to the fact that during medical rehabilitation of this category of patients, the method of choice is computer stabilization training with biofeedback, which has an advantage over the methods of therapeutic physical culture for restoring balance in relation to restoring the stability of the main stance.

### **Nutrition Support**

Nutritional support (NS) for cancer patients today is also recognized throughout the world as the main technology for medical rehabilitation of patients in this category due to the widespread prevalence of nutritional deficiency (ND) and its steady progression in the process of combined treatment of cancer. Particular attention is paid to this issue in our country.

The study by Gameyeva E.V. et al. assessed the effect of the NS on the course of the postoperative period using the example of 400 patients who underwent surgical treatment in P.A. Herzen Moscow Research Institute of Oncology between 2019 and 2021. The patients were divided into 2 groups: main ( $n = 200$ ) and control ( $n = 200$ ). The patients of the main group received a full-fledged NS. The control group consisted of patients, according to a retrospective analysis of patients, with a traditional approach to the NS. The study included patients with malnutrition and cancer of the upper gastrointestinal tract (GIT), colon and rectum, as well as head and neck. In his study, the author draws attention to the fact that the NS in the perioperative period improved nutritional status, increased the level of total protein and serum albumin and reduced the total number of surgical complications by 36 %, including the incidence of anastomotic leakage by 3 times ( $p = 0.014$ ), infectious complications — 1.5 times ( $p = 0.074$ ), reduce the length of stay in the intensive care unit, as well as in the hospital by 0.3 and 1.08 bed days, respectively ( $p < 0.05$ ) [10].

A similar positive effect was noted when carrying out the NS against the background of the systemic therapy for cancer. Another study by the same author [11] assessed the dynamics of the nutritional status of 632 cancer patients with cancer of the upper gastrointestinal tract (esophagus and stomach), colon and rectum, head and neck, and lungs who underwent drug antitumor treatment. The patients were also divided into 2 groups: the main group ( $n = 316$ ), in which NP was performed, and the control group ( $n = 316$ ). The work noted a tendency towards an increase in body weight of patients in these subgroups, while in the control group there was a statistically significant decrease in body weight compared to the initial indicators. Also, nutritious clinical nutrition contributed to an increase in the level of total protein and albumin. At the same time, according to the study, the improvement in nutritional status during systemic therapy led, within the statistical trend, to a decrease in the frequency of prolongation of intercourse intervals by 6 %, the need to reduce drug doses by 0.2–3.4 %, which increased the completion of the antitumor stages treatment by 2.9–11.1 %, which was confirmed in the work of N.A. Brish. et al. [12], which assessed the effect of nutritional deficiency (ND) correction on the effectiveness of neoadjuvant chemotherapy (NACT) in patients with locally advanced gastric cancer using the example of 200 patients, 100 of whom received the NS against the background of systemic therapy, 100 — a control group that didn't receive the NS. The authors noted that after completion of NACT in the NACT + NS group, the frequency of ND was 1 %, in the NACT without NP group — 62 %. In patients with ND, partial regression was recorded in the NACT+NP group ( $n = 54$ ) in 51.9 % of patients, in the NACT group ( $n = 47$ ) — in 27.6 % ( $p < 0.05$ ). The incidence of complications in the NACT+NS group was lower than in the NACT group. Two-year event-free survival in patients without ND in the NACT+NS group was 100 % versus 68.5 % in the NACT group ( $p < 0.001$ ); in patients with ND — 72.5 % versus 60.6 %, respectively ( $p < 0.05$ ).

### **Psychological Rehabilitation**

Our country has one of the strongest schools of oncology psychology, so there is enough work devoted to the use of

this technology of medical rehabilitation, especially taking into account the fact that psychological rehabilitation is the main technology of a complex of rehabilitation measures for patients with cancer.

The paper by Fedorenko M.V. et al considered the issues of psychological rehabilitation of cancer patients after radical antitumor treatment for thyroid cancer. The study involved 119 patients with thyroid cancer after radical antitumor treatment, receiving L-thyroxine replacement therapy and who did not have a relapse of the disease at the time of the study. The main group of thyroid cancer patients who underwent psychological training, demonstrated significant improvement of their well-being and mood ( $p < 0.05$ ) according to the SAN test. After the psychological training, indicators of situational and personal anxiety decreased. According to the Mini-mult test, the scores on the hypochondria and hysteria scales are significantly different. In the profile, according to the indicators of the Minimult personality questionnaire in the group of patients with thyroid cancer before psychological training, the T-units of the hysteria scale and the hypochondria scale were the highest. The behaviour of individuals of this type unconsciously transforms the struggle with illness into a struggle for the right to be considered sick. After the psychological impact, the profile of patients with thyroid cancer changed, the T-units on the scale of hypochondria, hysteria, and psychasthenia decreased. This shows that after the training, patients became more emotionally stable, less sensitive to environmental influences, and resistant to stress loads. T-units on the scale of hypomania or optimism and indicators on the impulsivity scale increased, which indicates the activity of the individual, the predominance of motivation to achieve a goal, and confidence in decision-making compared to the control group [13].

The study by Tkachenko G.A. et al. assessed the effect of laryngectomy on the mental state of patients. The study included 38 patients at various stages of treatment for laryngeal cancer. To assess the mental state, the Hospital Anxiety and Depression Scale (HADS) and the Severity of Psychopathological Symptoms Questionnaire (SCL-90-R) were used. The authors note that before surgery, the mental state of the patients in general was not statistically significantly different from the conditionally standard indicators (presented in the academic literature), although there was a slight increase in the scores on the depression and anxiety scales, as well as the distress severity index. Moreover, after the operation, all the patients' scores increased on all scales, but a statistically significant increase was recorded only on the scales of anxiety, depression, somatization, hostility, and interpersonal sensitivity. 6 months after laryngectomy, the patients showed high levels of distress; the average anxiety score decreases compared with the postoperative level, although it remains high relative to the preoperative level and normative indicators. There was a statistically significant increase in scores on the depression and interpersonal sensitivity scales. With such work, the team of authors emphasizes the need to create special programs for psychological rehabilitation of patients with laryngeal cancer, aimed at teaching them methods of independent regulation of their mental state in order to increase their resistance to stress [14].

Similar work is being carried out among patients with colorectal cancer. Another study by the same author [15], the results of which were published in 2022, included 26 patients who underwent surgical treatment for colorectal cancer 6 to 12 months before. The patients were divided into two groups: the main group — 12 patients who, in parallel with medical rehabilitation, received individual psychotherapy for 14 days; the control group — 14 patients who underwent only medical rehabilitation and a single psychologist's consultation with questionnaire completion (without psychotherapy). Psychological rehabilitation in this work included cognitive behavioral psychotherapy and biofeedback methods. The effectiveness of the psychological rehabilitation program was assessed using the Hospital Anxiety and Depression Scale (HADS) before the start of rehabilitation and after its completion. According to the findings, the psychological rehabilitation made it possible to reduce the level of anxiety in patients of the main group from  $8.6 \pm 0.5$  to  $7.4 \pm 0.3$  points ( $p = 0.052$ ). A qualitative analysis of the test results also showed that after a course of medical rehabilitation, including psychotherapeutic measures, the number of patients in the main group without depression significantly increased (41.7 %).

#### **Rehabilitation of Patients with Malignant Tumors of Various Localizations Mammary Gland**

Given the prevalence of breast cancer in the world and the socially active position of women, medical rehabilitation of breast cancer patients tends to be the most widely studied.

V.A. Kluge et al. [16] conducted a study, which included 228 patients with early breast cancer who received complex treatment for breast cancer took part, of which 114 patients were included in a prospective study and during the treatment were exposed to rehabilitation measures as part of the biopsychosocial approach and 114 were selected into the control group retrospectively using the paired selection method and were subjected to physical and psychological rehabilitation as prescribed by a doctor. Rehabilitation measures in the main group of patients were carried out in accordance with the biopsychosocial model. The authors came to the conclusion that medical rehabilitation of patients with early breast cancer should be carried out within the framework of a biopsychosocial model, taking into account both biological (genetic, anatomical, physiological, biochemical, etc.) disorders and psychological factors, including mental processes, individual psychological characteristics personality and behavior, as well as social. This work focuses on the fact that rehabilitation measures within the framework of the biopsychosocial model improve event-free survival rates in a group of patients with early breast cancer: event-free survival was 18.3 months ( $p = 0.0034$ ).

Evstigneeva I.S. et al. studied the effectiveness of the use of fluctuating currents in combination with pneumocompression, general magnetotherapy, local magnetotherapy, low-temperature argon plasma in patients after radical surgical treatment of breast cancer in the early postoperative period. It was a prospective simple randomized study including 190 women after Madden radical mastectomy or radical breast resection. The main group included women who were exposed to fluctuating

currents in the course of medical rehabilitation (physical therapy, balance therapy and sessions with a medical psychologist). Analysis of the obtained clinical and functional data showed that in the early postoperative period, against the background of standard drug therapy and a course of medical rehabilitation, the combination of fluctuating currents with intermittent pneumocompression, general and local magnetic therapy significantly reduced the degree of edema of the upper limb and the volume of lymphorrhea. The decline in the level of anxiety and depression, pain syndrome and general condition of cancer patients was most pronounced in the groups additionally receiving magnetotherapy. The authors concluded that an integrated approach to medical rehabilitation at stage I led to the preservation of results in the long-term period 1.5 and 6 months after surgery and did not cause adverse events [17].

The scientific article by Gerasimenko M.Yu. et al. considers the use of physiotherapy in medical rehabilitation programs for patients after surgical treatment of breast cancer. The study included 70 patients. The first group ( $n = 24$ ) underwent 10 procedures of fluctuating currents in the muscles of the shoulder girdle and upper limb on the side of surgery, the second group ( $n = 23$ ) underwent 10 procedures of fluctuating current therapy in combination with pressotherapy, and the third group ( $n = 23$ ) in addition to fluctuating currents and intermittent pneumocompression, received low-frequency magnetotherapy. In all patients, postoperative swelling decreases, pain syndrome decreases, the number of postoperative complications in the wound area decreased (inflammation, infectious processes, pain, suture dehiscence), the duration of lymphorrhea reduced, the volume and quality of movements increased, and sensory disturbances in the upper limb decreased. The authors concluded that the inclusion of fluctuating currents, intermittent pneumatic compression and low-frequency magnetic therapy in the medical rehabilitation program reduces the risk of postoperative complications and helps reduce the recovery period [18].

Considering the incidence of disabling nature of secondary lymphedema after the combined treatment of breast cancer and gynecological oncological diseases, research into the correction of this complication continues both throughout the world and in our country.

The most significant study in our country to date is the study by T.I. Grushina, the results of which were published in 2011, in which the long-term observation of 1460 patients with upper limb edema after a radical treatment of the primary breast cancer showed high efficiency of medical rehabilitation and significant persistence of the obtained results. The author used pneumocompression, electrical muscle stimulation and low-frequency magnetic therapy as therapeutic methods. At the same time, emphasis is placed on the fact that medical rehabilitation of patients should not only be early and comprehensive, but also individual and continuous [19].

Also the work by Grushina T.I. et al. (2015) presents a list of physiotherapeutic techniques that have shown their effectiveness in the treatment of lymphedema. The author included pneumatic compression, electrical neurostimulation of lymphatic drainage, electrical stimulation of the muscles of the shoulder girdle on the side of the operation, and low-frequency electrostatic therapy as such methods [20].

The study by Agranovich N.V. et al. assessed the effectiveness of conservative therapy for postmastectomy syndrome on the example of 105 women. The subjects were divided into 4 representative groups depending on the prescribed rehabilitation treatment complexes including exercise therapy, pressotherapy, LED photomatrix therapy, manual lymphatic drainage massage of the affected upper limb, massage of the cervical-collar region, as well as electrotherapy techniques, in particular, therapy with sinusoidal modulated currents (SMT therapy) and electrostatic massage of the upper limb on the side of the operation, which are used both separately and in combination in different groups. The authors noted a pronounced decrease in the volume of the upper limb in groups where, in addition to the standard regimen, electrostatic massage and SMT therapy were used. The inclusion of additional physiotherapeutic treatment methods in the standard program, in particular, electrostatic massage of the upper limb on the affected side and SMT therapy significantly enhances the therapeutic effect [21].

The study by Blinova K.A. et al. evaluated the effectiveness of a complex of rehabilitation measures for the treatment of moderate postmastectomy syndrome in women after a combined treatment of breast cancer. This study involved 30 patients whose therapy included psychotherapy, bicycle ergometry, various types of massage (pneumo- and lymphatic drainage), whirlpool baths, magnetic therapy, and group exercise therapy. The complex treatment helped to improve the overall well-being and resulted in a decrease in the volume of the upper limb, an increase in the range of motion in the shoulder joint, and restoration of sensitivity in the area of innervation of the axillary nerve on the side of the operation [22].

A similar trend was noted in the work of Sharzhanova N.A. et al., which included 50 patients with secondary lymphedema after combined treatment for breast cancer. A complex medical rehabilitation in this work included in the first group of patients ( $n = 23$ ) pneumocompression, electrical stimulation of the muscles of the shoulder girdle and magnetic therapy; in the second group, in which pain syndrome prevailed and limitation of movements in the shoulder joint, magnetic and electrotherapy without a pressotherapy were prescribed (27 patients). The procedures were received daily, for 14 days. As a result of a 14-day rehabilitation course, the pain syndrome was eliminated in all patients, and swelling of the soft tissues of the upper limb decreased [23].

The effectiveness of the combined approach, but with the additional prescription of a manual lymphatic drainage in accordance with all international recommendations, was noted in a study by A.M. Stepanova. et al., which describes the results of complex medical rehabilitation of 287 patients with postmastectomy syndrome and lymphedema of varying severity. All the patients were recommended a compression therapy in the form of wearing compression hosiery II–III compression classes during the day or bandaging, while for stage III lymphedema (according to the classification of the International Society of Lymphology — Society of Lymphology, ISL), elastic bandaging with the Mobiderm system was used. In the given work, the compression therapy was combined with an exercise therapy (ET), manual lymphatic drainage, the pressotherapy, a low-frequency

magnetotherapy on the limb area, and a selective vasoactive electrical stimulation. The procedures were carried out for 12–15 days, daily, and the course was repeated after 3 months. The work also compared the effectiveness of a classical compression therapy (compression hosiery/bandaging) with the method of kinesiological taping, which was carried out using a standard decongestant technique (fan technique), in combination with complex rehabilitation (kinesiological taping,  $n = 15$ ; classical compression therapy — group control,  $n = 15$ ). Interestingly, the work also evaluated long-term oncological outcomes in 120 patients. The frequency of progression and local relapses was compared in the group receiving comprehensive rehabilitation according to the scheme described above ( $n = 67$ ) and the control group, which received only compression therapy and exercise therapy ( $n = 53$ ). The groups were comparable in terms of oncological prognosis and received treatment for breast cancer. Long-term results and survival of patients were calculated using the Kaplan-Meier method. According to the authors, patients with grade 1 lymphedema experienced persistent complete regression of lymphedema in 76 % of cases, which was confirmed by perometry data; the effect persisted for 1.5 years. In the case of lymphedema of the 2nd–3rd degree, during complex rehabilitation, regression of edema was noted by  $78.2 \pm 4.1$  % ( $p < 0.03$ ). In the presence of fibrotic tissues (stages III–IV lymphedema), the additional use of the Mobiderm bandage system led to a «softening» of fibrosis, which made it possible to achieve satisfactory results even in such advanced cases. When comparing groups of patients receiving compression therapy and kinesio taping, along with complex rehabilitation, less effectiveness was noted in the kinesio taping group compared with the control group ( $p > 0.05$ ). When comparing the frequency of progression and local relapses in patients receiving comprehensive rehabilitation according with the above scheme and the control group (compression therapy, exercise therapy), it was noted that the difference in relapse-free survival and progression-free survival in these groups was statistically insignificant ( $p = 0.10$ ) [24].

The study conducted by Sidorova D.B. evaluated the effectiveness of the combination of conservative and surgical treatment of secondary lymphedema, namely subcutaneous surgical correction in the rehabilitation of breast cancer patients with advanced lymphedema of the upper limb. The author noted that the complex use of local low-frequency electro- and magnetic therapy, pneumatic compression and subcutaneous surgical correction in patients with late secondary lymphedema of the II–IV degree allows a statistically significant reduction in the excess volume of the edematous limb by an average of 85.9 %, the thickness of the subcutaneous fatty tissue in the hand area by 63.2 %, forearm — by 69.1 %, shoulder — by 49.5 %, regardless of the order of application of conservative methods [25].

### Reproductive System

Much research is devoted to tumors of the female reproductive system. The article by Kovalenko N.V. et al. considers comprehensive rehabilitation of patients after a treatment for endometrial cancer. The authors developed and evaluated the effectiveness of a staged medical rehabilitation system for 457 patients after combined treatment for endometrial cancer. Staged medical rehabilitation was carried out in 357 patients (the main

group), and 100 patients formed a comparison control group. The first stage of rehabilitation was carried out on an oncology bed and included antibiotic prophylaxis, prevention of thromboembolic complications, psychological support, and exercise therapy. Stages II and III were carried out in the rehabilitation department (24-hour stay and day hospital) and outpatient department. The program of stages II and III included: organization of a daily routine, diet therapy, sessions with a psychologist (individually and in groups), special physical exercises, therapeutic massage/hardware lymphatic drainage massage/electrostatic therapy of the lower extremities, transcranial electrotherapy using a sedative technique, general magnetic therapy, low-intensity cutaneous laser therapy, electrical stimulation (SMT) of the bladder. The number of postoperative inflammatory and urodynamic complications in the main group was minimized to 2.2 % (versus 6 % in the control group), manifestations of post-castration syndrome were observed in 24 % of young patients (versus 95 % in the control group), lymphatic edema of the lower limb/s — in 46 % of patients (versus 75 % in the control group). There was no negative impact of the used methods of physical rehabilitation on the course of the underlying disease. The authors showed that medical rehabilitation of patients after combined treatment for endometrial cancer should be comprehensive and continuous, then it will be effective. The implementation of a sequential transition of patients from the first stage of medical rehabilitation to subsequent ones on the basis of specialized medical organizations allows them to adequately address the issues of their rehabilitation treatment [26].

The article by Vlasina A.Yu. et al. presented a modern view on the rehabilitation of patients with gynecological oncological pathology. Physiological and psychological problems (post-varietomy and pain syndromes, sexual dysfunction, distress, general intoxication, chronic fatigue associated with malignancy) that arise in women after antitumor treatment are considered, and ways to solve them are outlined. Not only traditional methods of correcting complications are covered, but also the possibilities of alternative and adjuvant (auxiliary) therapy. Particular attention was paid to the importance of preventing relapses during the rehabilitation period, emphasizing the need to develop and implement a multidisciplinary approach to this group of patients with the mandatory participation of doctors of different specialties — oncologists, obstetricians-gynecologists, rehabilitation specialists, psychiatrists, psychologists, etc. According to the authors, medication should be combined and non-drug correction methods, develop and implement effective medical rehabilitation programs aimed at normalizing body functions after aggressive treatment of oncogynecological pathology: issues of normalizing hormonal imbalance using probiotics, prebiotics and synbiotics to restore the vaginal biotope, introducing exercise therapy at the stage of medical rehabilitation, and using physiotherapy are considered to normalize body functions in gynecological cancer patients (electrosleep), to improve blood circulation — ultrasound therapy, ascending and circular showers, electrostatic and vacuum massages, the use of methods of psychological rehabilitation of gynecological cancer patients: yoga, rehabilitation of cognitive-behavioral injuries using eye movements, art therapy, hypnotherapy, occupational

therapy, dance therapy. The authors note that it is important to conduct scientific research and familiarize doctors with the possibilities of recovery and resocialization of this category of patients. A correctly selected and implemented set of rehabilitation measures is the key to a high level of quality of life after treatment [27].

The study by Filonenko E.V. et al. evaluated the effectiveness of magnetic laser therapy in the rehabilitation of 78 patients with cervical cancer during the period of radiotherapy. According to the results obtained, the use of this technique during the radiation therapy resulted in radiation reactions in 24 (31 %) of 78 patients. When a concomitant magnetic laser therapy was used, radiation reactions corresponded to a predominantly mild degree of severity (stage I reactions were observed in 16 (21 %) patients, stage II — in 8 (10 %)), which made it possible to carry out the entire course of radiation therapy in 73 out of 78 patients in the planned volume and without interruptions [28].

The article by Berdichevsky B.A. et al. reviewed the rehabilitation of the functional state of the lower urinary tract after combined radiation treatment for cervical cancer. The effectiveness of various schemes for drug rehabilitation of lower urinary tract dysfunction was analyzed using the example of combined radiation treatment for cervical cancer. Clinical, laboratory and morphofunctional studies were carried out during radiation treatment and 12 months from the start of medical rehabilitation of post-radiation complications. The data obtained indicate a certain effectiveness of various schemes of drug protection of the tissue structures of the lower urinary tract from radiation exposure, however, only its combination with instillation of the bladder with a drug containing hyaluronic acid (Uro-hyal) allows achieving more effective medical rehabilitation, ensuring an acceptable quality for patients life. At the same time, instillation of the bladder with preparations containing hyaluronic acid (Uro-gyal) turned out to be the most effective [29].

Quite a few studies in our country have been devoted to the problems of medical rehabilitation of patients with cancer and urinary dysfunction. So, the work by Orlov A.E. et al. assessed the effectiveness of medical rehabilitation of prostate cancer patients suffering from urinary incontinence. The study included 152 patients, divided into 2 groups. Some of them ( $n = 74$ ) underwent neuromuscular electrical stimulation for 10 days in order to strengthen weakened bladder muscles and improve urinary control. The second group (78 patients) received neuromuscular stimulation procedures in combination with a course of specialized physical therapy. The authors noted that the implementation of a therapeutic complex including neuromuscular electrical stimulation and specialized exercise therapy (with continued implementation of the complex daily at home) had a more pronounced effect than the effect of electrical stimulation alone [30].

### Head and Neck

Head and neck tumors remain the subject of active study from the point of view of medical rehabilitation. So, the study by Kozlov S.V. et al. included 94 patients operated on for thyroid cancer. All the patients were divided into 2 groups, representative by age, stage of the disease, extent of surgical intervention and nature of concomitant pathology. The main group consisted of 48 people, the

control group — 45 people. All the patients of the main group, along with standard methods of breathing exercises, underwent: medicinal inhalation therapy (solutions of ambrobene, lazolvan, flumucil, tinctures of calendula and eucalyptus), light therapy in the area of postoperative sutures, cutaneous projection of the larynx, areas of the neck on the right or left with lateral lymph node dissection. In case of hypertension in patients of the main group, a low-frequency magnetic therapy was prescribed to the collar area. Transcranial electrical stimulation was prescribed to 10 patients with severe pain, sleep disorders and complaints of a depressed emotional state. In addition, the patients in the main group underwent psychocorrectional sessions with a psychologist. In addition to breathing exercises, the patients in the second (control) group were prescribed only drug inhalation therapy with the above medications for the same period. The treatment effectiveness was assessed clinically at the end of the course of procedures, which were carried out daily, for 10 days. The authors noted a significant positive effect of complex rehabilitation measures in the form of restoration of voice, disappearance of sore throat and discomfort when swallowing, regression of soft tissue swelling in the surgical area, stabilization of arterial blood, restoration of skin sensitivity and reduction of neurological symptoms, normalization of sleep and emotional status to a greater extent compared to the control group. Also, in the first group, the rate of postoperative scar formation was three to four days longer than in patients of the second group. There were no complications during treatment in both groups, which allowed the patients to complete their stay in the surgical hospital in a timely manner and begin in an adapted physical and psychological state. According to the data obtained by the authors, the individuals in the main group had higher quality of life scores on the scales of physical functioning (FF,  $p = 0.001$ ), vital activity (V,  $p = 0.01$ ) and lower pain intensity scores (B,  $p = 0.01$ ), which indicates a better state of physical health. The results of the study indicate that the quality of life of patients in the main group is significantly higher than that of the control group [31].

Voice-speech rehabilitation of patients with OHSS continues to develop in the Russian Federation and more and more studies are devoted to this issue. The article by Krasavina E.A. et al. examined the possibilities of speech rehabilitation of patients with cancer of the oral cavity and oropharynx after reconstructive plastic surgery. The study included 56 patients with cancer of the oral cavity and oropharynx, stages II–IV, who received combined treatment and speech rehabilitation in the Oncology Research Institute of Tomsk National Research Medical Center between 2012 and 2019, which included five stages: rational psychotherapy; breathing exercises; articulatory gymnastics for the muscles of the cheeks and lips; articulatory gymnastics for the tongue; correction of sound pronunciation disorders. Speech rehabilitation in this work began on days 16–32 after the operation. At the first stages, the aim of the exercises was to restore the activity and coordination of the muscles of the articulatory apparatus, speech exhalation and the reconstructed tongue, and then they began to correct sound pronunciation. Postoperative speech rehabilitation made it possible to improve the state of speech function in 100 % of cases (56 patients); a complete restoration of speech was achieved in 7 patients (12.5 %) [32].



### Other Localizations

Medical rehabilitation of orthopedic cancer patients is an urgent topic today, since primary bone tumors develop in patients of the working age. In addition, this service for patients in this category is currently paid for by the DRG «medical rehabilitation of oncological orthopedic patients».

The work by T.I. Grushina et al. included 36 patients (16 men, 20 women) aged from 19 to 67 years (mean age — 42 years) with primary malignant and metastatic tumors of the long bones. Endoprosthetics (EP) with the inclusion of a reconstructive plastic component of the knee joint was performed in 17 patients, hip joint — 13, shoulder joint — 5 and elbow joint — 1 patient. At the stage of pre-rehabilitation, medications (low-molecular forms of heparin, etc.) were used to prevent disorders of the hemostatic system and associated thrombotic complications. From the first day after surgery, in the scope of endoprosthetics of long bones and joints with the inclusion of a reconstructive plastic component, pharmacotherapy was carried out (anticoagulants, antibiotics, analgesics (including epidural anesthesia), muscle relaxants, neuroprotectors and sedatives), exercise therapy according to developed special methods, after which passive resection of the operated joint using the Artromot mechanotherapeutic device, local low-frequency magnetic therapy on the operation area, local low-intensity infrared laser radiation, multi-channel low-frequency electrical stimulation of the muscles of the operated limb. The authors noted that the combined use of a reconstructive plastic component with radical surgery and physical therapy made it possible to obtain a good functional result on the MSTS scale in 63.9 % of patients at the time of discharge, and in 36.1 % of patients. Early activation of patients also became possible, significantly shortening their stay in the surgical department; the period of activation was 1–9 days (Me 4.2 days), the average bed day was 13 (9–17) days [33].

More recent studies have confirmed the need for early activation of this category of patients. A study in P.A. Herzen Moscow Research Institute of Oncology carried out an analysis of stage I rehabilitation measures in 32 patients with primary and metastatic lesions of the long tubular bones and axial skeleton, who received surgical treatment of varying extent. 18 (56 %) patients underwent resection of long tubular bones with endoprosthetics of large joints (group 1), 14 (44 %) patients underwent decompressive and stabilizing operations on the spine and sacrum (group 2). For all patients, from the first day after surgery, isometric exercises began, including on the operated limb, exercises on the distal parts of the upper and lower extremities, and breathing exercises with an emphasis on diaphragmatic breathing. Subsequently, the exercise therapy complex expanded depending on the characteristics of the operation. In the group of patients who underwent decompression and stabilization surgery, from the first day after surgery, isometric exercises for all major muscle groups, breathing exercises with an emphasis on diaphragmatic breathing, and exercises for the distal parts of the upper and lower extremities began. From the second day, active and, if necessary, active-passive exercises were started on the main muscle groups of the upper and lower extremities with a gradual increase in the intensity of the loads and a change in starting positions. In

the presence of a neurological deficit, postural correction techniques, active (lightweight) exercises on the lower extremities, and passive gymnastics were additionally used. The timing of activation and verticalization, their technique in the early postoperative period differed depending on the level of surgery. The group of patients who underwent organ-preserving surgeries on the limbs showed positive dynamics in their general condition after completing the course of medical rehabilitation. There was a pronounced positive dynamics in the general status, improvement in motor function, and an increase in the range of motion in the operated joint [34].

The study by Ivanov V.E. et al. reviewed the medical rehabilitation of cancer patients after endoprosthetics of large joints. Functional rehabilitation included passive development of the operated joint, block therapy, and hydrokinesitherapy. The study included 70 patients (20 (29 %) children aged 11 to 18 years, 50 (71 %) adults). The average assessment of limb function after hip arthroplasty was 72 %, after knee arthroplasty in patients with a tumor of the distal femur — 83 %, after replacement of the proximal bone — 76 %, after total femoral arthroplasty — 67 %. Functional results after ankle replacement were 83 %, and after reconstructive interventions on the humerus they were 80 %. The authors note the need for further development of methods of medical rehabilitation of orthopedic cancer patients in specialized departments [35].

There are studies dealing with the rehabilitation of disseminated patients. Such as the work by Stepanova A.M. et al. that analyzed the influence of early postoperative rehabilitation on the functional results of patients with metastatic tumors of the axial skeleton using the example of 289 patients who received decompressive, decompressive and stabilizing operations on the spine and sacrum. The patients were divided into two groups: those receiving early postoperative comprehensive rehabilitation ( $n = 169$  (study group)) and the control group (no rehabilitation ( $n = 120$ )). The groups were comparable in terms of neurological status and pain intensity at the start of medical rehabilitation. In addition to exercise therapy, from the first day after the surgery, in the absence of thrombosis of the veins of the lower extremities, all the patients were prescribed massage of the lower extremities and electrotherapy from the third day. In the case of using a plastic component, moving flaps during operations on the sacrum, the volume of rehabilitation was supplemented from fifth day after the surgery with low-intensity laser therapy (LILT) and low-frequency magnetotherapy (LFMT) from the third day after the surgery. The author noted the positive dynamics of pain syndrome, frequency of pain relief, general condition and quality of life [36].

There are few studies on the medical rehabilitation of patients with central nervous system tumors all over the world, but our rehabilitation specialists pay great attention to this pathology. The work by E.A. Bukreeva et al. examined the medical rehabilitation of children with tumors of the central nervous system. According to the authors, comprehensive rehabilitation measures are necessary to facilitate the restoration and maintenance of the patient's physical performance, as they are of great importance for improving the quality of life and progressive development of a child who has suffered from cancer. The study included 54 children

aged from 7 months to 14 years; among children with ataxia older than one and a half years, 31 (57.4 %) patients were assessed by the Hauser Walking Index with a mean score of  $2.8 \pm 0.22$ ,  $SD = 1.24$ ,  $Me = 4.00$ , [2.00; 3.00]. When assessed after medical rehabilitation, the mean score increased to  $3.8 \pm 0.20$ ,  $SD = 1.16$ ,  $Me = 3.0$ , [3.00; 5.00]. It was concluded that the combination of physical rehabilitation methods used by the authors can be used not only in a hospital setting, but also at the 2nd and 3rd stages of medical rehabilitation, which is of absolute practical significance and allows minimizing the consequences of special treatment and, as a consequence, improve the quality of life of children and their parents [37].

### **Medical Rehabilitation in Health Resorts**

In our country, there are not many studies with a particular focus on sanatorium-resort treatment of patients with cancer.

A large study by M.G. Estenkova et al. evaluated the effectiveness of sanatorium-resort treatment for 348 people with different localizations of oncological pathology: gastrointestinal tract — 57, respiratory organs — 17, mammary gland — 76, female genital organs — 52, male genital organs — 41 people, the duration of the diseases varied from several months to 23 years. The programs of sanatorium-resort treatment in this category included technologies such as climate and landscape therapy, drinking mineral water, indifferent isothermal baths, therapeutic swimming, exercise therapy in the hall and pool, walking along the health path, inhalation therapy, certain types of hardware physiotherapy (low-frequency magnetic therapy, pressotherapy, lymphatic drainage procedures, sinusoidal modulated currents), diet therapy, psychotherapy. The authors noted an improvement in the general condition of patients, restoration of impaired functional indicators, and a pronounced psychotherapeutic effect of sanatorium-resort treatment associated with a decrease in psychosomatic manifestations and an increase in resistance to various stress factors [38].

Another study conducted by Yanchenko T.S. considered sanatorium-resort treatment of children in the period of remission of oncohematological and oncological diseases, taking into account the psychosomatic status. The work applies a differentiated approach to the use of a combination of various technologies of sanatorium-resort treatment, taking into account disorders of the psychosomatic status, concomitant diseases during the period of remission. Sanatorium-resort treatment for children contributed to a 1.6-fold reduction in negative psycho-emotional manifestations and an improvement in interpersonal relationships in the children's team. In addition, this study noted that the use of drinking courses of mineral water from the Kremenchug deposit (packaged) and bicarbonate-chloride-sodium water from the Evpatoria deposit (pump room) in children during the period of remission of cancer contributed to the restoration of metabolic processes, reducing the increased activity of the glycolytic enzyme LDH ( $p < 0.05$ ), improvement of the state of intestinal microflora. The feasibility of prescribing electrosleep therapy and chamber whirlpool baths is confirmed by the formation of a regulatory effect on the state of mental

health and sympathetic-adrenal processes, strengthening the compensatory capabilities of the body [39].

The work by Khudoev E.S. et al. conducted a review of medical rehabilitation of patients after combined treatment of breast cancer in a sanatorium-resort institution. Sanatorium-resort treatment is considered as an option for medical rehabilitation, indications and contraindications, late stage of medical rehabilitation, physical therapeutic resort factors for this category of patients. The authors note that medical rehabilitation at a resort is an insufficiently developed problem; approaches to its solution proposed by various authors are not widely used in practice. The authors emphasize that the medical rehabilitation program for this category of patients must be comprehensive, and rehabilitation measures must begin from the moment the diagnosis is made with the participation of a team of specialists, including an oncologist, psychologist, physiotherapist, physical therapy instructor and prosthetist [40].

The study by Meltsev E.M. et al. evaluated the effectiveness of spa treatment in 215 children receiving programme therapy for haemoblastosis and 32 children operated for thyroid cancer who were in remission. The author studied the long-term (after 1–3–5 years) results of the proposed complex in 42 children with hemoblastosis, 14 of them with a 3-time annual stay at the Evpatoria resort and 13 children with thyroid cancer. The complex carried out involved the influence of natural healing factors on the entire body as a whole with maximum rehabilitation of the immune, hormonal, skeletal systems and psycho-emotional sphere. The authors concluded that prescribing a course of medical rehabilitation in a sanatorium-resort organization for children with cancer pathology in remission is justified, as evidenced by the improvement in the general condition of children, the positive dynamics of clinical symptoms, a decrease in the number of colds during the period after recovery, and an improvement in indicators characterizing adaptive capabilities body, immune reactivity, hormonal mirror, antioxidant protection, psycho-emotional sphere, as well as the absence of complications and relapses [41].

### **CONCLUSION**

Recovery of a cancer patient should be aimed not only at eliminating the disease itself and restoring the physical functions of the body, but also at the most acceptable restoration of a person's ability to live in conditions of the disease and after it. Rehabilitation is carried out through the efforts of various specialists, who in their work need to consider the condition of the cancer patient and the characteristics of his personality. As the international guidelines increasingly recommend the development of patient rehabilitation programs, it is important to understand the experiences of oncology physiotherapists to assist in the development of effective oncology physiotherapy services. Sanatorium-resort and rehabilitation treatment of patients after oncology care needs investment and advocacy to ensure optimal care for all patients with cancer and meet standards of care. Improving rehabilitation care in accordance with recommendations can have a significant impact on the functioning and quality of life of oncological patients.

**ADDITIONAL INFORMATION**

**Arkady N. Daykhes**, Ph. D. (Med.), Deputy General Director for Strategic Development, Management and Assessment of Health Care Technologies, Federal Scientific and Clinical Center for Medical Rehabilitation and Balneology.

ORCID: <https://orcid.org/0000-0003-0990-181X>

**Alexey V. Shulaev**, Dr. Sci (Med.), Professor, Head of the Department of General Hygiene, Kazan State Medical University. E-mail: alexs\_shu@mail.ru;

ORCID: <https://orcid.org/0000-0002-2073-2538>

**Natalya V. Machula**, Deputy General Director for Health Resorts, Federal Scientific and Clinical Center for Medical Rehabilitation and Balneology.

**Alexandra M. Stepanova**, Ph. D. (Med.), Head of Medical Rehabilitation Department, P.A. Herzen Moscow Research Institute of Oncology, a branch of the National Medical Research Center of Radiology.

ORCID: <https://orcid.org/0000-0001-8085-8645>

**Anfisa M. Nikitina**, Ph. D. (Med.), Head of the Department of Organization of Medical Care and Sanatorium and Resort Affairs, Federal Scientific and Clinical Center for Medical Rehabilitation and Balneology.

ORCID: <https://orcid.org/0000-0001-9895-5048>

**Elena V. Gameeva**, Dr. Sci (Med.), Deputy Director for Therapeutic Work, P.A. Herzen Moscow Research Institute of Oncology, a branch of the National Medical Research Center of Radiology.

ORCID: <https://orcid.org/0000-0002-8509-4338>

**Vladimir N. Yushchuk**, Ph. D. (Med.), Assistant of the Department of Public Health and Health Care, Tver State Medical University.

ORCID: <https://orcid.org/0009-0004-6727-7140>

**Anastasia A. Shikaleva**, Assistant of professor, Department of General Hygiene, Kazan State Medical University.

ORCID: <https://orcid.org/0000-0003-1798-0490>

**Author Contributions.** All authors confirm their authorship according to the international ICMJE criteria (all authors contributed significantly to the conception, study design and preparation of the article, read and approved the final version before publication). Special contributions: Daykhes A.N., Shulaev A.V. — idea of the study, development of the study design, editing of the manuscript; Machula N.V., Stepanova A.M., Nikitina A.M., Gameeva E.V., Yushchuk V.N., Shikaleva A.A. — data analysis, manuscript writing (writing the text of the article).

**Funding.** This study was not supported by any external funding sources.

**Disclosure.** The authors declare no apparent or potential conflicts of interest related to the publication of this article.

**Data Access Statement.** The data that support the findings of this study are available on reasonable request from the corresponding author.

**References**

- Kovlen D.V. Scientific basis for the development of clinical guidelines for physical and rehabilitative medicine: speciality. Doct. Diss. St. Petersburg. 2018; 22 p. (In Russ.).
- Balluzek M.F., Ionova A.K., Mashkova M.V. et al. Organization of rehabilitation programs for cancer patients based on an interdisciplinary approach. Research'n Practical Medicine Journal. 2018; 5(4): 91–97. (In Russ.).
- Stepanova A.M., Merzljakova A.M., Tkachenko G.A., Kashija Sh.R. Physiotherapy, Mechanotherapy and Psychotherapy in Oncology. Bulletin of Rehabilitation Medicine. 2016; 5(75): 42–46. (In Russ.).
- Gameeva E.V., Stepanova A.M., Tkachenko G.A. et al. Complex rehabilitation of cancer patients. Journal of Modern Oncology. 2022; 24(1): 90–96. (In Russ.).
- Kasparov B.S., Semiglazova T.Y., Kovlen D.V. et al. A scientometric analysis of evidence-based studies of physical rehabilitation factors in breast cancer patients. Malignant Tumors. 2018; 8(4): 5–12. (In Russ.).
- Chechel'nitskaya S.M., Baerbach A.V., Zhuk D.V. et al. Personalized Physical Rehabilitation of Children with Cancer. Pediatrics. Peditria n.a. G.N. Speransky. 2021; 100(3): 61–69. <https://doi.org/10.24110/0031-403X-2021-100-3-61-69> (In Russ.).
- Sidorenko L.V., Chaykovskaya I.A., Golovko Y.A. et al. Sports as an effective method of rehabilitation for patients who have been cured of malignant tumors. Russian Journal of Pediatric Hematology and Oncology. 2019; 6(51): 149–150. (In Russ.).
- Terent'ev F.V., Majnazarova Je.S. Possibilities of adaptive physical education in the context of rehabilitation of adolescents with cancer. Vestnik Kyrgyzsko-Rossijskogo Slavanskogo Universiteta. 2021; 21(9): 181–185. (In Russ.).
- Rud' I.M. Stabilotaining in rehabilitation of patients with postural instability of different genesis: speciality. Doct. Diss. Moscow. 2018; 22 p. (In Russ.).
- Gameeva E.V., Stepanova A.M., Khoronenko V.E. et al. Nutritional support at the perioperative stage of treatment of oncological patients. Journal of Modern Oncology. 2022; 24(1): 125–132. <https://doi.org/10.26442/18151434.2022.1.201479> (In Russ.).
- Gameeva E.V., Stepanova A.M., Kostin A.A. Effects of nutritive support during drug antitumor treatment of oncological patients. Head and Neck Tumors. 2021; 11(4): 50–57. <https://doi.org/10.17650/2222-1468-2021-11-4-50-57> (In Russ.).
- Brish N.A., Semiglazova T.Y., Karachun A.M. et al. Effect of correction of nutritive insufficiency on the efficacy of neoadjuvant chemotherapy in patients with locally advanced gastric cancer. Journal of Modern Oncology. 2021; 23(3): 519–524. <https://doi.org/10.26442/18151434.2021.3.201075> (In Russ.).
- Fedorenko M.V., Afanas'eva Z.A., Akberov I.G. Psychological rehabilitation of cancer patients after radical anti-tumor treatment. Multidisciplinary approach: peculiarities of interdisciplinary interaction in the treatment of cancer patients. Proceedings of the All-Russian Scientific-Practical Conference with International Participation. 2018; St. Petersburg. Hippocrates. 2018; 96–97. (In Russ.).
- Tkachenko G.A., Podvyaznikov S.O., Mudunov A.M. et al. Psychological distress in cancer patients after laryngectomy. Head and Neck Tumors. 2019; 9(1): 104–110. (In Russ.).
- Tkachenko G.A., Kalashnikova I.A., Musaev I.E. et al. Psychological rehabilitation of colorectal cancer patients. Koloproktologia. 2022; 21(3): 85–91. <https://doi.org/10.33878/2073-7556-2022-21-3-85-91> (In Russ.).
- Kluge V.A., Semiglazova T.Y., Krivorotko P.V. et al. Biopsychosocial approach in the rehabilitation of patients with operable breast cancer. Medical Advice. 2020; (9): 188–196. (In Russ.).
- Evstigneeva I.S., Gerasimenko M.Ju., Esimova I.E. Application of physical factors in stage i of medical rehabilitation after radical surgical treatment of breast cancer. Bulletin of Rehabilitation Medicine. 2022; 21(2): 127–138. <https://doi.org/10.38025/2078-1962-2022-21-2-127-138> (In Russ.).
- Gerasimenko M.Ju., Evstigneeva I.S., Zajceva T.N., Salchak Ch.T. The use of physiotherapy in medical rehabilitation programs in the early postoperative period in patients after surgical treatment of breast cancer. Russian Journal of the Physial Therapy, Balneotherapy and Rehabilitation. 2019; 18(5): 296–304. <http://doi.org/10.17816/1681-3456-2019-18-5-296-304> (In Russ.).

19. Grushina T.I. Rehabilitation of patients after radical treatment of primary breast cancer using physical therapy methods. *Russian Journal of Physiotherapy, Balneology and Rehabilitation*. 2011; 10(2): 11–17. (In Russ.).
20. Grushina T.I., Kulikov A.G. The application of the physiotherapeutic methods for the rehabilitation of the women presenting with breast cancer of clinical group III with post-mastectomy oedema (Part 1). *Russian Journal of Physiotherapy, Balneology and Rehabilitation*. 2015; 14(5): 46–51. (In Russ.).
21. Agranovich N.V., Sivolapova M.S., Gebenov M.H. Possibilities and efficacy of different complexes of physical methods in the program of rehabilitation treatment of postmastectomy syndrome. *Health and education in the 21st century*. 2018; (20): 7. (In Russ.).
22. Blinova K.A., Belova V.V., Kastorskaya E.S. et al. Rehabilitation of patients with post-mastectomy syndrome. *Bulletin of the Ivanovo Medical Academy*. 2016; 21(1): 75–76. (In Russ.).
23. Sharzhanova N.A., Vazanov A.A. Application of physical factors in medical rehabilitation of patients with post-mastectomy syndrome. *Research'n Practical Medicine Journal*. 2019; 6(4): 293. (In Russ.).
24. Stepanova A.M., Merzlyakova A.M., Khulamkhanova M.M., Trofimova O.P. The post-mastectomy syndrome: the secondary lymphedema after the combined treatment of breast cancer (the literature review and own results). *Journal of Modern Oncology*. 2018; 20(2): 45–49. [https://doi.org/10.26442/1815-1434\\_2018.2.45-49](https://doi.org/10.26442/1815-1434_2018.2.45-49) (In Russ.).
25. Sidorov D.B. Effectiveness of conservative methods and subcutaneous surgical correction in the rehabilitation of breast cancer patients with late upper limb lymphedema: speciality. *Doct. Diss. Moscow*. 2020: 21 p. (In Russ.).
26. Kovalenko N.V., Zhavoronkova V.V., Lysenko M.A., Grushina T.I. Kompleksnaya Reabilitaciya Pacientok Posle Lecheniya Raka Endometriya. *Voprosy kurortologii, fizioterapii, i lechebnoi fizicheskoi kultury*. 2021; 98(3–2): 89. <https://doi.org/10.17116/kurort20219803221> (In Russ.).
27. Vlasina A.Yu., Idrisova L.E., Solopova A.G. et al. Rehabilitation of oncogynecological patients after antitumor therapy: solutions. *Obstetrics, Gynecology and Reproduction*. 2020; 14(1): 44–55. <https://doi.org/10.17749/2313-7347.2020.14.1.44-55> (In Russ.).
28. Filonenko E.V., Demidova L.V., Boyko A.V. et al. Magnetic-laser accompaniment therapy in oncogynecologic patients at the stages of radiotherapy. *Oncology. P.A. Herzen Journal of Oncology*. 2014; 3(2): 89–89. (In Russ.).
29. Berdichevsky B.A., Zotov P.B., Petrov I.M. et al. Reabilitaciya funkcional'nogo sostoyaniya nizhnih mochevyh putej posle kombinirovannogo luchevego lecheniya pri rake shejki matki. *Palliative Medicine and Rehabilitation*. 2020; (4): 37–40. (In Russ.).
30. Orlov A.E., Yashkov A.V., Sivokhina T.A. et al. Correction of urinary incontinence as a complication of radical treatment of prostate cancer. *Izvestiya Samara Scientific Center of the Russian Academy of Sciences*. 2015; 17(2–3): 618–621. (In Russ.).
31. Kozlov S.V., Sivokhina T.A., Burmistrova S.A. et al. Application of complex methods of rehabilitation in the treatment of thyroid cancer patients at the stage of early recovery period. *Aspirantskiy Vestnik Povolzhya*. 2018; 18(1–2): 104–108. (In Russ.).
32. Krasavina E.A., Chojnzonov E.L., Kul'bakin D.E. et al. Speech Rehabilitation of Patients with Oral Cavity and Oropharyngeal Cancers after Reconstructive Surgery. *Siberian Journal of Oncology*. 2020; 19(5): 35–43. <https://doi.org/10.21294/1814-4861-2020-19-5-35-43> (In Russ.).
33. Grushina T.I., Teplyakov V.V. Physiotherapy in early rehabilitation of patients with bone sarcomas after arthroplasty of large bones and joints. *Voprosy kurortologii, fizioterapii, i lechebnoi fizicheskoi kultury*. 2020; 97(3): 53–59. <https://doi.org/10.17116/kurort20209703153> (In Russ.).
34. Kaprin A.D., Aliev M.D., Filonenko E.V. et al. Efficiency of Early Activation of Patients after Onco-Orthopedic Operations in the Framework of Stage I of Rehabilitation. *Physical and Rehabilitation Medicine, Medical Rehabilitation*. 2021; 3(2): 207–213. <https://doi.org/10.36425/rehab70762> (In Russ.).
35. Ivanov V.E., Kuril'chik A.A., Starodubcev A.L. et al. Rehabilitation of bone cancer patients after endoprosthetic replacement of large joints. *Journal of Investigative Practical Medicine*. 2018; 5(2): 194 p. (In Russ.).
36. Stepanova A.M., Merzlyakova A.M., Khulamkhanova M.M. Rannyya posleoperacionnaya reabilitaciya i ee otdalennye funkcional'nye rezul'taty u pacientov s opuholyami aksial'nogo skeleta. *Malignant Tumors*. 2018; 3(1): 12–16 (In Russ.).
37. Bukreeva E.A., Petrichenko A.V., Ivanova N.M. Opyt sanatornogo lecheniya sindroma hronicheskoy ustalosti. *Voprosy kurortologii, fizioterapii, i lechebnoi fizicheskoi kultury*. 2021; 98(3–2): 52–53. <https://doi.org/10.17116/kurort20219803221> (In Russ.).
38. Estenkova M.G., Elizarov A.N. The use of shockwave puncture for the combined treatment of the patients presenting with lumbosacral dorsopathies. *Russian Journal of Physiotherapy, Balneology and Rehabilitation*. 2013; (6): 54–55. (In Russ.).
39. Janchenko T.S. Sanatorium rehabilitation of children in remission of oncohematological and oncological diseases, taking into account the psychosomatic status: speciality *Doct. Diss. Moscow*. 2015: 22 p. (In Russ.).
40. Hudoev Je.S., Hodasevich L.S., Naslednikova I.O., Hodasevich A.L. Medical rehabilitation at a resort for breast cancer patients after combined treatment. *Resort Medicine*. 2020; (2): 21–31. (In Russ.).
41. Meltseva E.M., Kaladze N.N., Karmazina I.V. Rehabilitation of cancer patients and opportunities of the sanatorium-resort stage. *Herald of Physiotherapy and Health Resort Therapy*. 2015; 21(2): 143 p. (In Russ.).