

Peculiarities of rehabilitation of patients with musculoskeletal disorders: what has changed during the war in Ukraine

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ABSTRACT

Aim: The aim of the study was to investigate changes in the structure of musculoskeletal injuries in patients during the war in Ukraine and to determine the organizational and methodological features of the rehabilitation of patients with these injuries according to the conclusions of rehabilitation specialists.

Materials and Methods: The study was conducted in 2022-2024, 102 rehabilitation specialists participated in it. Scientific methods: analysis of sources of scientific information, questionnaires, statistical methods. The survey of rehabilitation specialists was conducted using the author's questionnaire, which contains 27 questions divided into 3 blocks.

Results: It was established that during the war years, significant changes occurred in the structure of appeals from patients with musculoskeletal diseases. The share of appeals for help for limb amputations increased to 23.6%, for injuries to joints, muscles and tendons – to 37.3%, for habitual dislocation of the patella – to 6.8%. Physiotherapists are convinced that the quality of rehabilitation services can be improved by using the latest equipment (35.3%), systematic advanced training of specialists (26.5%), expanding access to equipment (21.6%), and introducing the latest physiotherapy methods (13.7%).

Conclusions: Based on the conducted research, a system of exercise therapy tools for certain diseases of the musculoskeletal system and the sequence of their application were determined, and practical recommendations were developed for the rehabilitation of the population with musculoskeletal disorders, taking into account changes in their structure and the opinions of rehabilitation specialists who have experience working during the war in Ukraine.

KEY WORDS: physical therapy, musculoskeletal disorders, physical therapist, health, rehabilitation specialist

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INTRODUCTION

According to the World Health Organization (WHO), more than 30 % of the world's population suffers from musculoskeletal disorders, such as osteochondrosis, osteoporosis, arthritis, etc. [1]. The 120 types of these disorders included in the International Classification of Diseases (ICD-10) are accompanied by acute or chronic pain, limit a person's motor activity, and often lead to disability [1]. Disorders of the musculoskeletal system can lead to a deterioration in health and a decrease in the ability to work, which has significant economic consequences for the state [2].

In the structure of the prevalence of diseases, the pathology of the musculoskeletal system has been ranked fourth in Ukraine over the past 25 years [3].

The proportion of musculoskeletal system diseases in the overall morbidity structure in Ukraine in 2014 averaged 4.74 ± 0.14 % and ranged from 4.53 to 5.01 %. In 2022, these indicators deteriorated: the proportion of diseases was 5.54 ± 0.14 %, ranging from 5.37 % to 5.89 %. The increase in morbidity is explained by this class's chronically progressive course of diseases and their accumulation in the population [4, 5].

Physical therapy is an effective method of restoring the health status of the population with musculoskeletal disorders [6]. The physical therapy method is based on the use of restorative physical exercises and the patient's active participation in the treatment process. The level of such activity is individual, considering the nature of the disease, the degree of functional impair-

ment, and the patient's general health, motivation, and readiness for physical activity [7]. The restoration of patients' health by physical therapy is carried out using kinesiotherapy (therapeutic physical education (TPE)), therapeutic massage, manual therapy, biomechanotherapy, Kinesio taping, etc. [8]. However, the importance of specific physical therapy means, and their system in improving the health of the population with musculoskeletal disorders has not been comprehensively addressed despite the particular relevance of physical therapy in wartime.

AIM

The aim of the study was to investigate changes in the structure of musculoskeletal injuries in patients during the war in Ukraine and to determine the organizational and methodological features of the rehabilitation of patients with these injuries according to the opinion of rehabilitation specialists.

OBJECTIVES

1) to compare the structure of musculoskeletal disorders of patients before the war (2022) and during the war in Ukraine (2022-2024); 2) to find out the opinion of rehabilitation specialists on measures that will help improve the quality of rehabilitation services; 3) to specify the organizational and methodological peculiarities of rehabilitation of patients with the most common disorders; 4) to develop practical recommendations for the rehabilitation of the population with musculoskeletal disorders through physical therapy.

MATERIALS AND METHODS

The research was conducted in 2022-2024 at Zhytomyr Medical Institute of Zhytomyr Regional Council and Zhytomyr Ivan Franko State University. It involved 102 rehabilitation therapists from Zhytomyr, Kyiv, Sumy and Vinnytsia regions of Ukraine. The formation of the sample for the survey involved the selection of only those rehabilitation therapists who have a diploma in the specialty "Physical Therapy, Occupational Therapy" and professional experience of at least 5 years or professional experience during the war in Ukraine with wounded and injured military personnel and civilians. Criteria such as gender, age, marital status, level of financial satisfaction, place of residence were not taken into account in the study. The participation of respondents in the survey was voluntary, only those rehabilitation therapists who signed the Informed consent to participate in the study were included.

The following scientific methods were used to achieve the aim of the research: analysis of scientific information sources, questionnaire, and statistical methods.

The analysis of scientific information sources was used to clarify the essence of physical therapy and the impact of its means on improving the health of the population with musculoskeletal disorders. 16 sources from PubMed, Scopus, Web of Science, Index Copernicus and other databases were analyzed. The main attention during the selection of literary sources was focused on clarifying the essence of physical therapy, its purpose, objectives, principles, means, types of musculoskeletal disorders, the use of physical therapy in the process of improving the health of the population with musculoskeletal disorders. The key words in the publications selected for our study were: physical therapy, rehabilitation, musculoskeletal disorders.

The survey of rehabilitation therapists was conducted to study the impact of physical therapy on improving the health of patients with various musculoskeletal disorders and to examine the importance of physical therapy in improving the health of the population with musculoskeletal disorders. The questionnaire was presented in 3 blocks. Block I ("Disorders of the musculoskeletal system and means of physical therapy") contains questions that studied the level of knowledge of respondents about types of disorders of the musculoskeletal system and means of physical therapy. Block II ("Physical therapy of patients with musculoskeletal disorders") includes questions that obtained information about specific means of physical therapy used by rehabilitation therapists to improve the health of the population with these disorders; frequency of their use; types of necessary equipment; the role of an individual approach to patients in the process of physical therapy; duration and intensity of the course of therapy; main difficulties that arise during rehabilitation; systematicity in improving the qualifications of rehabilitation therapists; possibilities of introducing technological and medical innovations into physical therapy; conditions for conducting physical therapy for patients with relevant disorders; ways to improve the quality of rehabilitation services. Questions of Block III ("Effectiveness of physical therapy methods for musculoskeletal disorders") aimed to study the most effective physical therapy methods for patients with the most common musculoskeletal disorders, and the problems of integrating physical therapy into the process of general rehabilitation of patients with musculoskeletal disorders. The survey of the rehabilitation therapists was conducted according to the author's questionnaire, which contains 27 questions. The survey was conducted remotely using the GOOGLE-FORMS tool.

The questionnaire was posted at the link: <https://docs.google.com/forms/d/1b3jUbQ8zib7XOM5ZpzL0LBCM-fNv2QM3B7x8vw0EMV3U/edit>. The questionnaire was anonymous without any references to the authors of the article in the answers. The results were used for scientific purposes only. The questionnaire was assessed by the experts in this field (2 professors and 5 associate professors). It was approved by the Academic Council of Zhytomyr Medical Institute of Zhytomyr Regional Council (Protocol No. 5 dated 03.10.2022).

The survey results were processed using a statistical method. All results of the rehabilitation therapist survey were presented in percentages. The research also determined the percentage difference in the frequency of visits to physical therapists for patients with musculoskeletal disorders at the beginning of the war (2022) and during the war (2022-2024). Data was calculated using the MS Excel software package on a personal computer.

Consent to voluntary participation in the survey was obtained from all the respondents involved in the study. This research followed the regulations of the World Medical Association Declaration of Helsinki – ethical principles for medical research involving human subjects.

RESULTS

Based on the study of many sources of scientific information [2, 3, 6, 7, 8], we found that the purpose of rehabilitation is to preserve, partially or completely restore, lost or weakened motor functions, further ensure the body's lifelong performance, and integrate the patient into society. Realizing the goal of rehabilitation is based on solving the following tasks: a) effective recovery (complete or compensation for insufficient recovery using physical therapy); b) adaptation of patients to everyday life using ergotherapy equipment. The main stages of the rehabilitation process are also defined: examination (determination of motor disorders and activity), planning (creation of a physical rehabilitation program), intervention (program implementation), and control (ensuring optimal functioning of the physical rehabilitation system).

Physical therapy is based on the following principles: 1) early initiation of therapeutic measures, which allows for quick recovery of body functions and prevention of complications; 2) continuity, phasing, and combination of alternation of different means; 3) individualization, i.e., the use of programs created for each patient: considering their characteristics regarding musculoskeletal disorders, age, gender, etc. Group therapeutic physical education sessions provide spiritual support and make patients feel like community members, which gives

them confidence in their abilities and helps them recover faster.

In the process of surveying the rehabilitation specialists, we found that the main musculoskeletal disorders of patients who sought medical care from physical therapists at the beginning of the war are scoliosis – 40.2 %, injuries of joints, muscles, and tendons – 26.5 %, osteoarthritis – 10.8 %, hip dysplasia – 8.8 %, osteoporosis – 5.9 % and other (arthritis, amputations and all of the above) – 7.8 % (Fig. 1).

According to rehabilitation specialists, there were significant changes in the structure of patients' visits with musculoskeletal disorders during the war years. The proportion of visits for help with limb amputations increased by 23.6 %, injuries of joints, muscles, and tendons by 37.3 %, habitual patellar dislocation by 6.8 %, osteochondrosis and arthritis by 6.8 % (Table 1).

It has been found that among the main methods of physical therapy used by physical therapists to improve the health of the musculoskeletal system of their patients are therapeutic massage – 42.2 %, TPE – 33.3 %, Kinesio taping – 14.7 %, manual therapy – 4.9 %, yoga – 4.9 %. At the same time, according to the rehabilitation therapists, the priority factors in drawing up an individual rehabilitation plan for patients with musculoskeletal disorders are type of disorder – 40.2 %, physical activity – 33.3 %, and patient's age – 20.6 %.

Assessment of rehabilitation therapists' opinions on effective means of physical therapy for patients depending on certain disorders of the musculoskeletal system shows that the most effective means are: for injuries of joints, muscles and tendons: 35.4 % – exercise therapy, 23.5 % – therapeutic massage, 22.7 % – Kinesio taping, 18.4 % – mechanotherapy; in case of amputations: 30.9 % – exercise therapy, 25.1 % – therapeutic massage, 23.6 % – Kinesio taping, 20.4 % – mechanotherapy; for scoliosis: 40.1 % – exercise therapy, 33.3 % – therapeutic massage, 11.7 % – yoga; for hip dysplasia: 45.1 % – exercise therapy, 25.5 % – therapeutic massage, 15.6 % – Kinesio taping, 13.8 % – mechanotherapy; for habitual patellar dislocation: 36.0 % – exercise therapy, 30.4 % – Kinesio taping, 18.6 % – therapeutic massage; for osteochondrosis: 46.1 % – exercise therapy, 16.7 % – therapeutic massage, 14.7 % – mechanotherapy, 13.7 % – Kinesio taping, 8.8 % – manual therapy; for osteoarthritis (arthrosis): 45.1 % – exercise therapy, 14.7 % – mechanotherapy, 13.7 % – therapeutic massage, 8.8 % – manual therapy; for osteoporosis: 41.2 % – exercise therapy, 25.5 % – therapeutic massage, 11.7 % – mechanical therapy. As we can see, the main means of physical therapy for most musculoskeletal disorders are exercise therapy, therapeutic massage, Kinesio taping, and mechanotherapy.

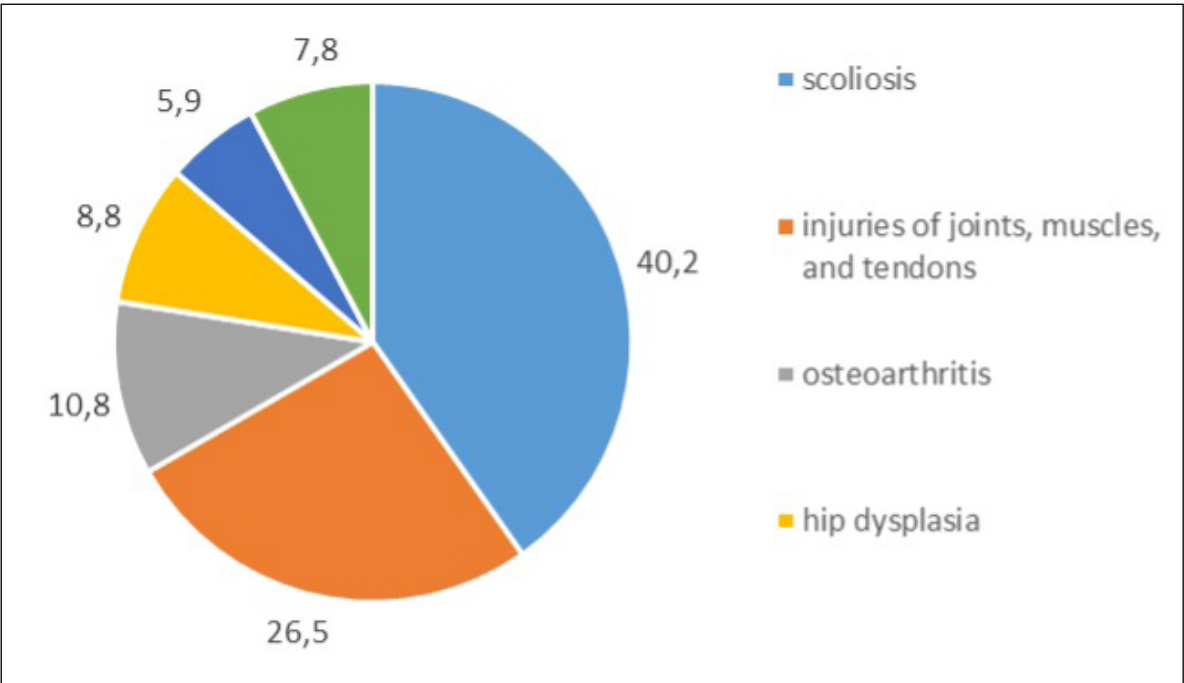


Fig. 1. The most common musculoskeletal disorders of patients at the beginning of the war
Picture taken by the authors

Table 1. Comparison of the frequency of visits to physical therapists for patients with musculoskeletal disorders at the beginning of the war (2022) and during the war (2022-2024), %

Type of disorder	Frequency of visits, %		Percentage difference, %
	2022 (at the beginning of the war)	2022-2024 (during the war)	
Scoliosis	40.2	12.7	- 27.5
Injuries to joints, muscles, and tendons	26.5	37.3	+ 10.8
Osteoarthritis	10.8	2.0	- 8.8
Hip dysplasia	8.8	8.8	0.0
Osteoporosis	5.9	2.0	- 3.9
Habitual patellar dislocation	2.0	6.8	+ 4.8
Amputations of limbs	1.0	23.6	+22.6
Osteochondrosis, arthritis	4.8	6.8	+ 2.0

Source: compiled by the authors of this study

Also, in the course of the survey, we have found that the physical therapists observe the following results in the health status of patients with musculoskeletal disorders as a result of physical therapy: 62.7 % – significant improvement, 31.4 % – moderate improvement, 5.9 % – no change or minimal improvement. At the same time, the rehabilitation therapists noted that they use physical therapy as an adjunct to the medical treatment of patients with musculoskeletal disorders: in most cases (64.7 %), always (23.5 %), rarely (11.8 %). According to the rehabilitation therapists, more intensive physical therapy may be required for patients with the following conditions: after injuries (62.7 %), chronic diseases (18.6 %), and postoperative conditions (13.7 %). It has

been found that the rehabilitation therapists determine the effectiveness of physical therapy for each patient according to the following criteria: 54.9 % – by the indicator of improvement of motor activity, 30.4 % – by changes in physical condition, 14.7 % – by the indicator of pain reduction.

The rehabilitation therapists indicated how they respond to a patient’s refusal to undergo physical therapy and how they try to convince them of its importance: 59.8 % look for an individual approach, 21.6 % explain the need for treatment in detail, and 9.8 % show examples of how physical therapy is used. It has been found that 76.5 % of the rehabilitation therapists determine the optimal duration and intensity of physical therapy

Table 2. Recommendations for the use of physical therapy means for various disorders of the musculoskeletal system

Disorder type	Kinesiotherapy	Therapeutic massage	Kinesio taping	Mechanical therapy	Manual therapy
Injuries to joints, muscles, and tendons	1	2	3	4	-
Amputations	1	2	3	4	-
Scoliosis	1	2	-	-	-
Dysplasia of the hip joints	1	2	3	4	-
Habitual dislocation of the patella	1	3	2	-	-
Osteochondrosis	1	2	4	3	5

Source: compiled by the authors of this study

for a particular patient based on an individual approach to each case, 18.6 % – taking into account medical indicators, and 4.9 % – according to standard treatment. It has been established that the main problems or difficulties faced by the rehabilitation therapists in the implementation of physical therapy in the rehabilitation process are 50.0 % – patients' refusal to participate in rehabilitation, 36.3 % – lack of equipment, lack of coordination between specialists – 8.8 %, lack of specialized knowledge – 4.9 %. It has been found that the surveyed rehabilitation specialists update their knowledge and skills in the field of physical therapy (advanced training, internships, etc.): 70.6 % – regularly, several times a year, 15.7 % – once a year, 10.8 % – every few years, 2.9 % – do not update their knowledge. The need for individualized approaches to patients when choosing physical therapy methods is determined by 66.7 % of the rehabilitation therapists based on individual medical indicators, 26.5 % – on the analysis of the patient's lifestyle and wishes, and 6.8 % – on the results of communication with other specialists.

Among the main problems of integrating physical therapy into general rehabilitation of patients with musculoskeletal disorders, the respondents believe 36.3 % – of limited resources, 35.3 % – of low patient motivation, and 28.4 % – a lack of coordination between specialists. At the same time, 56.8 % of the rehabilitation therapists consider family participation in physical therapy for patients with musculoskeletal disorders to be very important, 40.1 % – important. The physical therapists are convinced that the quality of rehabilitation services for patients with musculoskeletal disorders can be improved in the following ways: 35.3 % by using the latest equipment, 26.5 % by systematically improving the qualifications of specialists, 21.6 % by increasing access to appropriate equipment, and 13.7 % by introducing the latest methods of physical therapy.

Based on the research, a set of physical therapy means for certain musculoskeletal disorders has been specified, and practical recommendations have been developed to improve the health of the population

with musculoskeletal disorders through physical therapy (Table 2).

1. TPE (kinesiotherapy) effectively restores patients' health with scoliosis, hip dysplasia, arthritis, osteochondrosis, herniated discs, mechanical injuries, common patellar dislocations, muscle and tendon sprains, etc. We offer a set of exercises on S. M. Bubnovskyi's training devices that have proven effective. The exercises are divided into three blocks, which are part of the structure of each training session. They are prescribed and adjusted based on the intensity of low back pain, limiting factors, high blood pressure, heart pain, dizziness, headache, severe shortness of breath, excessive sweating, and leg and abdominal pain. If these factors appear, the exercise is stopped, and the patient consults with a doctor to determine whether or not to continue training.

The kinesiotherapy course consists of three cycles, each consisting of twelve training sessions. The first cycle is adaptation, the second is recovery and training, and the third is training.

When developing a rehabilitation program for patients, the following tasks are set: normalization of functional parameters of the patient's body; removal of fear of movement; restoration of the motor stereotype; elimination of spasms of the spinal muscles; improvement of spinal hemodynamics; normalization of posture; reduction of intensity or elimination of pain; prevention of recurrence of low back pain or reduction of their frequency and severity.

2. Therapeutic massage is used for osteochondrosis and scoliosis. The lower back massage focuses on several muscles, including the latissimus dorsi, the quadratus minor, and the spinal straightening muscle, located around the lower half of the spine. A variety of reasons can cause low back pain. The main cause of low back pain is muscle tension. A lower back massage helps warm up the muscles and improve blood and lymphatic circulation, encouraging the movement of beneficial nutrients through the body and eliminating large amounts of toxins. The

massage has the following objectives: to stimulate blood and lymph circulation in the extremities and spine; to reduce pain; to increase the tone of the hypotrophic muscles of the back of the thigh and lower leg, as well as the gluteal muscles; to minimize tension and tone of the long muscles of the back.

3. Kinesio taping is most effective for scoliosis, habitual patellar dislocations, and arthrosis. Taping is applying a type of elastic plaster (Kinesio tape) to painful areas of the body. Spinal taping relieves pain, supports back muscles, and corrects posture. Back Kinesio taping is used for chronic injuries, osteochondrosis, sprains, and pain during rehabilitation after injuries. The back taping increases blood and lymph flow and promotes a quick recovery without painkillers. During Kinesio taping, the patient should lean forward as much as possible. Then, the anchor is glued to the upper part of the gluteal region. Long strips are directed vertically upwards, parallel to the vertebrae on each side. Kinesio taping of the back is performed without tensioning the bandages.
4. Mechanotherapy (biomechanotherapy) is effective in herniated discs, scoliosis, osteochondrosis, arthrosis, habitual patellar dislocations, and hip dysplasia. Comprehensive treatment of patients is based on determining the cause of pain in the musculoskeletal system. Special exercises that work with muscles to eliminate the source of pain are used. Non-surgical treatment is performed under the supervision of a physical therapist. For a long time, with the above diseases, the muscles do not work physiologically: sometimes they spasm; sometimes, on the contrary, there is a lack of muscle tone and strength. Dr. Pavlenko developed the "Symmetry" training simulator so that it is possible to work out a single muscle or a group of muscles, expand it, or give a dynamic load. The simulator provides gentle conditions for the spine: no vertical load on the spinal column allows treating hernias and protrusions.
5. Manual therapy is an important component of the treatment of various diseases of the musculoskeletal system. It includes manipulations and mobilizations of joints and muscles aimed at reducing pain and improving the patient's mobility and functional status. Manual therapy can help with arthrosis, osteochondrosis, herniated discs, sprains, and strains.

DISCUSSION

The WHO definition of health focuses on its physical, mental, and social components [9]. A person who has all these aspects of well-being is healthy. When health is lost, therapy is required. Therapy is the treatment of

internal diseases using various methods. The method of physical therapy involves using such means as therapeutic physical education (TPE), manual therapy, mechanotherapy, Kinesio taping, therapeutic massage, etc. [10, 11].

These means are used to restore a person's immediate physical health, although they also improve their mental and social well-being to some extent. In this way, physical therapy differs from rehabilitation, which aims to restore a person's health comprehensively, return to the profession, and establish social ties [12]. Therefore, physical therapy is a part of rehabilitation that helps restore a person's physical health. This area of rehabilitation is also called "physical rehabilitation" (physical therapy) [13]. The physical therapy method is used in cases where the full functioning of the musculoskeletal system and the body's capacity is weakened or completely lost, which worsens the general state of human health [6].

According to experts [14], diseases of the musculoskeletal system rank third in the structure of primary disability among adults and the able-bodied population, behind only circulatory system diseases and cancer. Every year in Ukraine, more than 15 thousand adults become disabled because of musculoskeletal diseases, including more than 12 thousand people of working age (the working age population includes people aged 18 to retirement age). In addition, the category of patients with permanent disability is also significant [3, 5]. The proportion of newly registered musculoskeletal system diseases in the adult population during 2002-2022 was 5.54 ± 0.14 %. The proportion of primary disability due to peptic ulcer diseases of the musculoskeletal system was much higher and amounted to 10.85 ± 0.75 % with an upward trend [4]. During the war in Ukraine, the number of disabled people with musculoskeletal disorders increased significantly not only among military personnel, but also among the civilian population, but their statistical data is difficult to determine due to the ongoing hostilities.

According to scientists [15, 16], the main reasons for the increase in the level of disability due to diseases of the musculoskeletal system are: 1) patients are at late stages or do not receive full treatment due to the territorial inaccessibility of diagnosis and treatment, as well as the lack of financial capacity to pay for treatment and purchase of medicines; 2) late diagnosis of these diseases at the outpatient stage, lack of a comprehensive approach to the choice of treatment and correction of concomitant disorders leads to progression and complications of the disease. Although group III disabilities account for more than 80 % of disability due to musculoskeletal diseases, they have a very low probability

of recovering their ability to work, hence the constant increase in the number of disabled people in society.

The research results showed that significant changes took place during the war in the organization of the rehabilitation of patients with musculoskeletal disorders. Such changes are explained by the growing number of patients needing professional assistance, as well as the need to intensify their rehabilitation process. Organizational changes require specialists who can formulate comprehensive individual programs and carry out rehabilitation work with patients using a range of physical therapy tools, namely: doctors of physical and rehabilitation medicine, physical therapists, physical therapists' assistants, ergotherapists, and ergotherapists' assistants. These specialists are pushing out highly specialized professionals from the labor market, such as exercise therapy instructors, massage therapists, etc.

The results of the survey show that the intensification of rehabilitation of patients with musculoskeletal disorders and its effectiveness is possible only if comprehensive individual programs are developed and implemented, which include the use of a whole

range of physical therapy tools, including new ones (for example, Kinesio taping and the use of hardware technologies) and which clearly define the sequence of work with these tools. The results of our research confirm the findings of many scientists in this area and complement them.

CONCLUSIONS

Based on the conducted research, the system of physical therapy tools for certain diseases of the musculoskeletal system and the sequence of their application have been clarified, practical recommendations have been developed for the rehabilitation of the population with musculoskeletal disorders, taking into account changes in their structure and the opinions of rehabilitation specialists with experience working during the war in Ukraine.

PROSPECTS FOR FURTHER RESEARCH

The study of the effect of Kinesio taping on the recovery of spinal injuries and disorders in athletes is planned.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest

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