

L. A. MALKEVICH, O. O. CHESHIK, I. A. LEMESHEVSKI

**MEDICAL REHABILITATION  
IN THE EARLY RECOVERY PERIOD OF ACUTE  
CEREBRAL CIRCULATION DISORDER**

Minsk BSMU 2024

МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ  
БЕЛОРУССКИЙ ГОСУДАРСТВЕННЫЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ  
КАФЕДРА МЕДИЦИНСКОЙ РЕАБИЛИТАЦИИ И ФИЗИОТЕРАПИИ

**Л. А. Малькевич, О. О. Чешик,  
И. А. Лемешевский**

**МЕДИЦИНСКАЯ РЕАБИЛИТАЦИЯ  
В РАННЕМ ВОССТАНОВИТЕЛЬНОМ ПЕРИОДЕ  
ОСТРОГО НАРУШЕНИЯ  
МОЗГОВОГО КРОВООБРАЩЕНИЯ**

**MEDICAL REHABILITATION  
IN THE EARLY RECOVERY PERIOD OF ACUTE  
CEREBRAL CIRCULATION DISORDER**

Учебно-методическое пособие



Минск БГМУ 2024

УДК 616.831-005-036.11-036.82-085.8(075.8)

ББК 54.10я73

M21

Рекомендовано Научно-методическим советом университета в качестве учебно-методического пособия 15.05.2024 г., протокол № 17

Рецензенты: д-р мед. наук, проф., зав. каф. нервных и нейрохирургических болезней Белорусского государственного медицинского университета А. С. Федулов; каф. неврологии и нейрохирургии с курсами медицинской реабилитации, психиатрии, ФПКиП Гомельского государственного медицинского университета

**Малькевич, Л. А.**

M21 Медицинская реабилитация в раннем восстановительном периоде острого нарушения мозгового кровообращения = Medical rehabilitation in the early recovery period of acute cerebral circulation disorder : учебно-методическое пособие / Л. А. Малькевич, О. О. Чешик, И. А. Лемешевский. – Минск : БГМУ, 2024. – 36 с.

ISBN 978-985-21-1681-7.

Освещены возможности применения адекватных средств реабилитации в раннем восстановительном периоде острого нарушения мозгового кровообращения и профилактики.

Предназначено для студентов 6-го курса медицинского факультета иностранных учащихся, обучающихся по специальности 1-79 01 01 «Лечебное дело» по учебной дисциплине «Физиотерапия и медицинская реабилитация».

УДК 616.831-005-036.11-036.82-085.8(075.8)

ББК 54.10я73

ISBN 978-985-21-1681-7

© Малькевич Л. А., Чешик О. О., Лемешевский И. А., 2024  
© УО «Белорусский государственный медицинский университет», 2024

## LIST OF ABBREVIATIONS

- FC — functional class  
FT — physiotherapeutic treatment  
CNS — central nervous system  
HR — number of heartbeats  
ECG — electrocardiogram  
FIM — Functional Independence Measure (modified functional independence scale)  
IMRP — individual medical rehabilitation program  
MR — medical rehabilitation

## MOTIVATIONAL CHARACTERISTICS OF THE TOPIC

**Total lesson time:** 7 hours.

The educational manual presents material on early medical rehabilitation (inpatient stage) of patients with acute cerebrovascular accident.

Medical rehabilitation of patients with acute cerebrovascular accident is an integral part of the protocol for the management and observation of people in this category. Students know the means and methods of medical rehabilitation, but their use is not always justified due to a lack of understanding of the points of application of the action of these means from the standpoint of the fundamental concept of rehabilitation — the concept of the consequences of diseases (including improving the functional state of the patient). Reducing or preventing functional impairments in diseases and injuries is the main goal of medical rehabilitation of various categories of patients, including those with stroke.

**Purpose of the lesson:** to familiarize students with the possibilities of early medical rehabilitation of patients with acute cerebrovascular accident at the inpatient stage.

**Lesson objectives:**

- study the stages and possibilities of using medical rehabilitation means in patients with stroke;
- learn to determine the functional abilities of patients with stroke;
- learn to assess patients' readiness to actively participate in the rehabilitation process;
- learn to choose the main means of medical rehabilitation for this category of patients;
- be able to explain the mechanism of action of the main means of medical rehabilitation used in neurology;
- learn to draw up individual rehabilitation programs for acute stroke at the inpatient stage.

**Requirements for the initial level of knowledge.** To fully master the topic, the student should repeat:

- from the course of normal physiology: physiology of excitable tissues; muscle contractions; conduction of nerve impulses and neuromuscular transmission; general physiology of the central nervous system; private physiology of the central nervous system; nervous regulation of autonomic functions; higher nervous activity;
- from the course of neurology: vascular diseases of the brain;
- internal diseases: main diseases of the cardiovascular system, pathogenesis and treatment.

**Test questions from related disciplines:**

1. The concept of physical performance.
2. Systems that limit physical performance.
3. The body's reactions to physiotherapy.
4. Contraindications to physiotherapeutic treatment.
5. Basic principles of therapeutic and prophylactic use of physical factors.
6. Therapeutic exercise in the system of medical rehabilitation of sick and disabled people.
7. Vascular diseases of the brain.
8. Anatomy of the central nervous system
9. Classification of physical exercises depending on the modes of muscle contraction, mechanisms of energy supply to muscle activity and intensity of physical activity.

**Test questions on the topic of the lesson:**

1. Stroke, stages of medical rehabilitation. Goals and methods of rehabilitation influence.
2. Means of medical rehabilitation of stroke.
3. Kinesitherapy and occupational therapy, classification and characteristics of kinesitherapy means.
4. Indications and contraindications for prescribing medical rehabilitation means (kinesitherapy, physiotherapy, massage, mechanotherapy and others).
5. Possibilities of using physiotherapy methods at the early stage of medical rehabilitation in patients with stroke.
6. Possibilities of using robotic simulators in patients with strokes.
7. Psychotherapy and its use in patients with stroke, post-stroke depression and cognitive impairment.
8. Speech therapy assistance in the rehabilitation of stroke patients.
9. According to the ICDH model, what type of disorders are disorders associated with stroke?
10. Methods of functional diagnostics for stroke.

## INTRODUCTION

Stroke is one of the main causes of morbidity, mortality, long-term disability and disability in society. Strokes include conditions ranging from sudden loss of consciousness until the gradual (over several minutes, hours) appearance of focal and (or) general cerebral neurological symptoms that persist for a long time longer than 24 hours and can lead to early death of the patient. Stroke also are the second most common cause of dementia, the most common a common cause of epilepsy in adults and a common cause of depression. Annually cerebral stroke develops in 5.5–6 million people, of which 4.5 million die. In the Republic of Belarus, 32.5 thousand patients suffered a stroke in 2019. People those of working age make up approximately 30 % of the total number.

Stroke is the predominant cause of disability in the population (3.2 per 1000 population). Only 8 % of surviving patients can return to their previous job. Mortality from stroke among working people able age has increased over the past 10 years by more than 30 % (41 per 100,000 population). Early 30-day mortality is 16 %. According to epidemiological population studies, the frequency of expectations, prognosis for restoration of impaired functions by the first and third him a month of ischemic stroke (IS), the likelihood of a recurrent stroke is not the same for different subtypes of AI. According to the results of population studies, the incidence of atherothrombotic stroke is 16 %, cardioembolic — 29 %, lacunar — 16 %, stroke due to rarer causes — 3 %, stroke of unknown etiology — 36 %. The risk of recurrent stroke during the first 30 days of illness is higher in atherothrombotic stroke compared with other pathogenetically all options. There are four periods of development of stroke:

- acute (1 month);
- early recovery (up to 6 months);
- late recovery (6–12 months);
- period of residual effects (residual).

There is no single recovery time after stroke, rehabilitation time depends on the size and localization of the affected area, the type of stroke that, as well as the time that passed from the onset of the disease to the knowledge of specialized assistance. Approximate terms of rehabilitation can be represented as follows:

1. Stroke with minimal neurological deficit: mild paralysis face, limbs, blurred vision, lack of coordination, dizziness circling. Partial recovery occurs after 1–2 months, complete possible in 2–3 months, but depends on rehabilitation potential patient.

2. Stroke with severe neurological deficit: severe paralysis face, limbs, serious coordination problems. Possibility of self-service appears in the patient after 6 months, full recovery it takes years.

3. Severe hemorrhagic and ischemic strokes with persistent neurological deficiency lead to disability of the patient due to paralysis and other defects. Partial restoration is possible in 1–2 years. In case of severe neurological deficit, complete recovery is impossible due to the death of important clusters of brain neurons whose functions are not can take over neighboring cells.

It is important for the patient to realize that recovery from any stroke it shouldn't end. Short daily procedures are not will only help to return former skills and qualities, but will also prevent new ones stroke attacks.

Rehabilitation of patients after stroke — active the process of realizing their capabilities (physical, psychological, professional, educational, recreational) within the framework of violations, called illness, limitations in life activity and desires. Patients after a stroke, they are at high risk of recurrent attacks, medical rehabilitation improves their quality of life.

Numerous studies have proven that the earlier you start rehabilitation measures for patients with stroke, the more effective they are, therefore, early rehabilitation is of particular importance.

## **PRINCIPLES OF MEDICAL REHABILITATION**

Principles of medical rehabilitation are:

- early start of rehabilitation;
- strict dosing of exposure;
- the need to comply with the principles of continuity (rehabilitation must be continuous and last until the end of life);
- the patient must actively participate in the rehabilitation process and be aware of his role in achieving the optimal result;
- rehabilitation should be aimed at preventing complications and exacerbations of the disease;
- for each patient, the rehabilitation program must be individual.

## **GOAL AND TASKS**

**The goal** of medical rehabilitation of patients who have suffered a cerebral stroke is improvement of functional abilities and social and everyday activity of patients.

**Objectives** of medical rehabilitation:

- reducing the severity of functional disorders resulting from the disease;
- prevention of the development of complications, including disabling ones;

- expansion of motor activity;
- improvement of psycho-emotional state;
- improving quality of life.

## **MEANS OF MEDICAL REHABILITATION**

**Means of medical rehabilitation** at the inpatient stage:

- drug therapy;
- psychotherapy;
- physical rehabilitation (kinesiotherapy);
- physiotherapy;
- occupational therapy;
- Acupuncture;
- diet therapy and the use of medical and technical means of rehabilitation.

To successfully carry out rehabilitation measures, it is necessary to correctly assess the state of the impaired function in each patient, determine the possibility of its independent restoration, as well as the degree, nature and duration of the defect, and on the basis of this, select adequate methods and methods for minimizing the patient's impairment.

The rehabilitation process begins and ends with an assessment of the patient's functional capabilities. To determine the reserves of the functional systems of the human body, functional stress tests are used. They are understood as research methods in which the system is influenced by various factors that change, to one degree or another, the state of homeostasis. The more economical the reaction to exposure and the better the body tolerates the influence of factors, the greater the body's capabilities and the less likely it is to fail adaptive capabilities and cause disease. This allows us to identify functional stress tests. Before starting a patient's rehabilitation program, it is necessary to assess his functional capabilities.

**The severity of the consequences of cerebral circulatory disorders** can vary: from small to very significant, which is determined by the functional class.

When assessing the severity of the degree of functional impairment, 5 functional classes were identified:

- FC 0 — no violations;
- FC 1 — 25 % loss of function;
- FC 2 — 26–50 % loss of function;
- FC 3 — 51–75 % loss of function;
- FC 4 — more than 75 % loss of function or its complete absence.

There is no single recovery period after stroke, rehabilitation time depends on the size and location of the affected area, the type of stroke, as well as the time that has passed from the onset of the disease to the provision of medical care. Each



patient needs to select an individual set of rehabilitation measures. But when drawing up an individual rehabilitation program, it is necessary to take into account contraindications to certain methods of rehabilitation treatment.

**General contraindications** for medical rehabilitation are determined by the order of the Ministry of Health of the Republic of Belarus dated September 09, 2022. № 1141 «On the procedure for providing medical rehabilitation in outpatient, inpatient, day-care settings, as well as outside healthcare organizations”:

- somatic diseases in the acute stage, decompensation, terminal stage;
- acute, including infectious, diseases before recovery;
- organic personality disorders accompanied by antisocial behavior and (or) disinhibition of drives;
- acute psychotic states;
- epilepsy and epileptic syndromes with frequent generalized and secondary generalized seizures;
- acute thrombosis, embolism as concomitant diseases
- circulatory failure above IIA st;
- cardiac rhythm and conduction disorders: ventricular fibrillation, ventricular flutter, ventricular asystole;
- respiratory failure stage III.

## **MEDICAL REHABILITATION AT THE INPATIENT STAGE**

**Medical rehabilitation** of patients with stroke **at the inpatient stage** is carried out in two stages:

The first stage — **treatment and rehabilitation** — is carried out in the acute period in intensive care units, inpatient departments of healthcare organizations for the treatment of patients with stroke in the absence of medical contraindications to medical rehabilitation and as part of the provision of medical care. The treatment and rehabilitation stage is carried out on the basis of interaction between the attending physician and other specialists — members of a multidisciplinary team working in the field of medical rehabilitation (rehabilitation doctor, exercise therapy doctor; physiotherapist; medical psychologist; speech therapist; instructor-methodologist for medical rehabilitation; FTL nurses; massage nurses and others).

The second stage — the stage **of early inpatient medical rehabilitation** — is carried out in the acute period and early recovery period of the disease in inpatient departments of early medical rehabilitation.

The rehabilitation doctor conducts expert rehabilitation diagnostics: assesses rehabilitation potential, establishes a clinical and functional diagnosis, determines the rehabilitation prognosis, functional class of disorders, category of

disability, etc. An assessment of the functional state for neurological disorders is given in application 1.

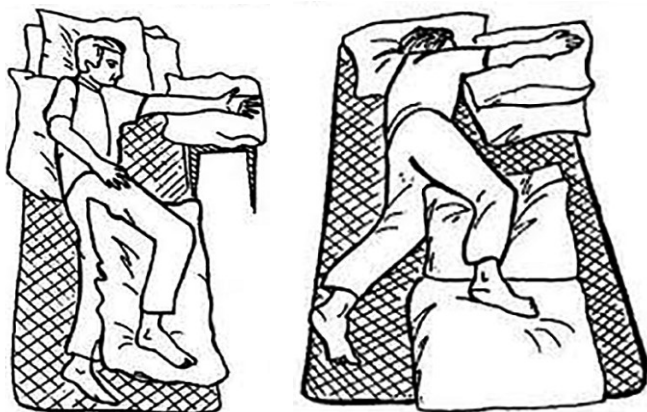
The ultimate goals of rehabilitation measures in the acute period of cerebral stroke are the maximum possible verticalization of the patient — ensuring the ability to independently maintain balance in an upright position, including with additional means of support; restoration of walking function, appropriate to the patient's capabilities, with or without the use of assistive devices; restoration of the manipulative ability of the upper limb, the ability to self-care, and communicate with others.

When carrying out medical rehabilitation, **an individual medical rehabilitation program** (IMRP) is drawn up and filled out for the patient, which indicates the comprehensive use of medications, rehabilitation methods, as well as means that adapt the environment to the functional capabilities of the patient and (or) the functionality of the patient to the environment, in including through the use of mobility aids, prosthetics and orthotics, etc. (application 2).

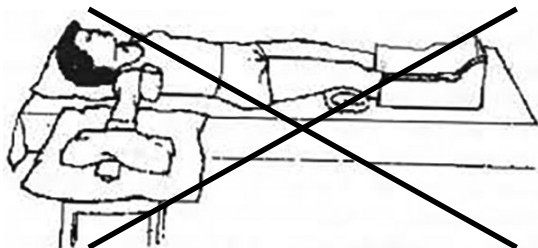
Rehabilitation measures begin already in **the intensive care unit**. During this period, the patient is in a supine position; often, with a severe form of stroke, the patient is motionless. During this period, rehabilitation measures are limited by the patient's condition and consist of positional treatment, systematic turning over, a specialized anti-decubitus mattress, breathing exercises (if the patient is conscious and can perceive commands) and verticalization.

### TREATMENT BY POSITION

From the first hours of a patient with stroke in **the intensive care unit** it is necessary to control the position of the body in bed, since information from deep proprioceptors enters the central nervous system and incorrect position of the body, head and limbs will contribute to either an increase or decrease in reflex activity, which most often leads to the development of pathological pos. Positioning in bed helps prevent the development of contractures, bedsores, pain, pathological conditions in the limbs and torso, and helps restore impulses from proprioceptors of muscles and tendons, which are lost as a result of a stroke. To properly perform positional treatment, it is necessary to use special rollers or pillows filled with hygroscopic material. Positional treatment involves placing the paralyzed limbs in the following positions of the patient: on the healthy side, on the paralyzed side — the Sims position (Fig. 1). It should be noted that in order to prevent the formation of spastic tone, it is not allowed to place a load on the palm and fingers, as well as to create support for the foot in the absence of closure of the knee joints (Fig. 2), lying on the back with the head end raised — Fowler's position (Fig. 3). Incorrect position in bed leads to the development of muscle rigidity, limited range of motion and muscle retractions. These disorders further aggravate the state of helplessness caused by stroke.



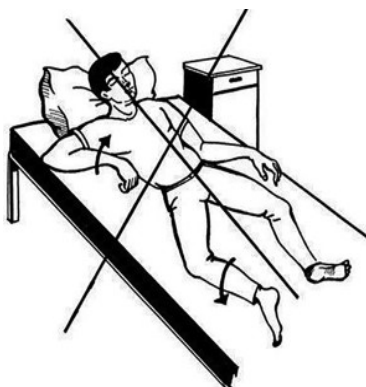
*Fig. 1. Sims position*



*Fig. 2. Incorrect installation*



*Fig. 3. Fowler's position*



*Fig. 4. Wernicke-Mann pose*

The goal of positional therapy is to place paralyzed limbs in the correct position while the patient is in bed. According to the literature, the development of hemiplegic contracture with the formation of the Wernicke-Mann posture (the arm is adducted, supinated, bent at the elbow and wrist joints, the fingers are clenched into a fist, the leg is rotated outward, straightened, the foot droops and is rotated inward (Fig. 4) is associated with prolonged the presence of paretic limbs in the same position in the early period of the disease: constant afferentation from muscles whose attachment points are close together increases the stretch reflex and leads to the formation of stagnant foci of excitation in the central parts of the nervous system. Therefore, it is very important to prevent prolonged fixation of the limbs in the same position. The patient should remain in each position from 30 minutes to 60 minutes. The duration of positioning treatment is determined individually, guided by the patient's feelings. If complaints of discomfort or pain appear, the situation is changed. Throughout the day, positional treatment is prescribed every 2 hours. During this period, positional treatment is carried out in the initial position lying on the back. If fixation of the limbs reduces the tone, then passive movements are carried out immediately after it, gradually bringing the amplitude to the limits of physiological mobility in the joint. Start with the proximal limbs. Before the passive one, an active exercise is carried out on the healthy limb, that is, the passive movement is first "unlearned" on the healthy limb.

When treating with position, special attention should be paid to ensuring that on the paralyzed side the entire arm and shoulder joint are at the same level in a horizontal plane to avoid stretching of the shoulder joint bursa under the influence of gravity of the limb.

Patient positioning should accompany the entire course of treatment. For patients who cannot independently stand up and hold themselves in an upright position due to the severity of their general condition, **passive verticalization** using a rotary table-verticalizer is indicated, which should begin in the first 48 hours from the development of the disease (Fig. 5).



*Fig. 5. Vertical table*

The purpose of passive verticalization is to provide orthostatic training, maintaining adequate autonomic support for motor activity, protecting afferentation from articular and muscle-tendon receptors when closing the joints of the lower extremities and spine, improving respiratory function, maintaining the reflex mechanism for bowel and bladder emptying.

Carrying out passive verticalization is possible with stable hemodynamics, since when using a verticalizer table, a decrease in blood pressure is possible.

**Contraindications for verticalization are:** dizziness, blurred vision, cognitive deficit, loss of consciousness, tachypnea more than 24 breaths per minute, tachycardia more than 90 beats per minute, increased sweating, acute myocardial infarction, subarachnoid hemorrhage in unclipped aneurysm, shock, agonal state (brain death), thromboembolism pulmonary artery, increasing thrombosis or the presence of a floating thrombus (in the absence of a vena cava filter), unstabilized fracture of the spine, pelvis, lower extremities.

The use of a vertical table is a new technology for early rehabilitation of patients with ischemic stroke, which is being actively implemented in our country, allowing to improve the course of the disease, impaired neurological functions and, as a result, improve the quality of life of patients.

It is necessary to maintain verbal contact with the patient, even if he does not have a pronounced reaction to speech: passive listening activates attention, and understanding of speech gradually returns.

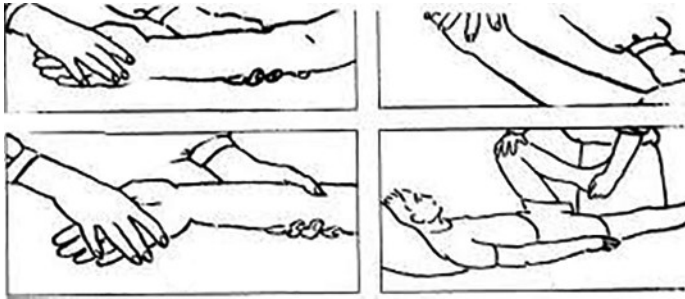
## STAGE OF EARLY INPATIENT MEDICAL REHABILITATION

**This stage of early inpatient medical rehabilitation** is carried out in inpatient early medical rehabilitation departments.

During this period, treatment continues with positioning, systematic rotation of the patient in bed, breathing exercises, passive, passive-active kinesiotherapy (*motion treatment* — specialized gymnastics with the help of an instructor-methodologist), verticalization, bedside robotic simulators are used. All classes are conducted strictly individually.

Passive movements improve blood flow in paralyzed limbs, can help reduce muscle tone, and also stimulate the appearance of active movements due to the reflex influence of afferent impulses that occur in the muscles and joints of paralyzed limbs. Such exercises help maintain normal mobility in the joints and preserve the patient's understanding of normally performed movements. Each series of movements should be performed strictly in one plane with a gradual increase in the amplitude of movements and constant visual control of the patient. Passive movements are performed at a slow pace (a fast pace can help increase tone), smoothly, rhythmically, repeatedly, without jerking, on both the sick and healthy side. Each series of movements should be performed strictly in one plane with a

gradual increase in the amplitude of movements and constant visual control of the patient. To do this, the methodologist clasps the limb above the joint with one hand, and with the other below the joint, then making movements in this joint as fully as possible (Fig. 6). The number of repetitions for each of the articular axes is 8–10.



*Fig. 6. Passive kinesiotherapy*

Passive movements are combined with breathing exercises and teaching the patient to actively relax muscles.

Among the passive exercises, it is necessary to highlight the passive imitation of walking (Fig. 7), which serves to prepare the patient for walking while he is still in bed: the methodologist, clasping his hands around the lower third of the shins of both legs, bent at the knee joint, performs their alternate flexion and extension in knee and hip joints with simultaneous sliding of the feet on the bed.



*Fig. 7. Walking simulation*

When performing passive movements, special attention is paid to suppressing synkinesis in paralyzed limbs. When moving the lower limb, in order to prevent the appearance of synkinesis in the paretic arm, the patient is recommended

to clasp the fingers of the hands in the “lock” position, or clasp the elbow joints with the palms.

If the patient can already perform a certain range of movements, passive-active kinesiotherapy is added.

Active gymnastics begins in the absence of contraindications; the main requirement is strict dosing of the load and its gradual increase.

Load dosing is carried out by changing the amplitude, tempo, number of repetitions of the movement and the degree of physical tension.

With severe paresis, active gymnastics begins with static exercises as the easiest. These exercises consist of holding the limb segments in their given position, and it is very important to choose the correct starting position.

Dynamic exercises are performed primarily for muscles whose tone usually does not increase: for the abductor muscles of the shoulder; arch supports; extensors of the forearm, hand and fingers; abductor muscles of the thigh and flexors of the leg. For severe paresis, they begin with ideomotor exercises (the patient must first mentally imagine the given movement, and then try to perform it, giving a verbal assessment of the actions performed) and movements in facilitated conditions. Facilitated conditions involve eliminating, in one way or another, the effects of gravity and friction, which make it difficult to perform movements. To do this, active movements are performed in a horizontal plane on a smooth slippery surface, using a system of blocks and hammocks, as well as the help of a methodologist who supports the limb segments below and above the working joint. When conducting active kinesiotherapy, patient participation is important. Motivating the patient for a speedy recovery significantly improves the prognosis of the disease.

At the stage of early inpatient medical rehabilitation, the patient is taught to sit in bed and get out of it with the help of an instructor-methodologist and independently, walk around the ward and go out into the corridor. As the patient’s motor regimen expands, group exercises are added to individual exercises in the exercise therapy room using robotic simulators (mechanotherapy).

## **MECHANOTHERAPY**

**Mechanotherapy** is an important component of acute stroke rehabilitation, which helps patients perform dosed physical exercises to restore joint movements with the help of special devices and allows for an optimal level of physical activity even in the most severe cases, when the patient is unable to move independently. Mechanotherapeutic devices allow you to perform movements without the risk of overloading the muscles and causing complications. All movements are performed sequentially and gradually, which allows you to restore the functions of muscles and joints.

Mechanotherapeutic devices are divided into devices of passive, active-passive and active action.

**Passive devices** are robotic devices that are controlled using a computer program. The device accurately doses the load, exercises are performed evenly, at the same pace and each time with a constant or gradually increasing load. Movement training in the limbs is carried out in the directions of abduction, adduction, flexion, extension and rotation. After turning on devices of this type, their blocks begin to move, setting the limb attached to them in motion. Passive action devices have been used since the first days by patients who have suffered a stroke (Fig. 8). At the beginning of the lesson, the limb is fixed, the exercises are performed strictly in the given direction, the amplitude of movements is gradually increased until pain appears.



Fig. 8. Apparatus for passive kinesiotherapy

The duration of this type of lesson is from 15 minutes to 1 hour. The number of lessons is from 1 to 3 per day.

Electrically driven **active-passive mechanotherapy is designed to perform various exercises in active and passive modes for the upper and lower extremities** (Fig. 9). In passive mode, you can adjust the rotation speed, in active mode, you can change the degree of resistance. The duration of classes of this type is 15–30 minutes. Number of classes — 2–3 per day.

**Active mechanotherapeutic devices** are devices that are set in motion by the patient himself, making certain efforts (Fig. 10).

The operation of the devices is based on the block principle (weights are used), on the pendulum principle (inertia is used) and on the isokinetic mode of muscle work. The block apparatus consists of a block through which a cable passes. At one end of the cable there is a patient's limb, at the other there is a load of up to 3 kg. As the weight of the load increases, the force that the patient must apply to lift the load increases. The exercises are performed with the patient standing, sitting and lying down. Active movements in the limbs set the pendulum in motion, creating inertial force. This is what is used to train joints.





*Fig. 9.* Device for active-passive kinesiotherapy



*Fig. 10.* Active mechanotherapeutic device

The use of loads weighing more than 3–5 kg in post-stroke patients is not used, since adverse hemodynamic reactions develop (increased diastolic blood pressure, decreased cardiac output and volumetric cerebral blood flow velocity). The choice of mechanotherapy regimen for each individual patient is based on taking into account the state of his cardiovascular system and muscle tone. In the presence of severe spasticity, the load is given only to the healthy limb. With a moderate increase in muscle tone on the side of hemiparesis, loads are allowed only on the extensor muscles of the fingers, hand and forearm. The weight of the load when working with both a healthy and paretic limb should not exceed 0.5–1 kg, the rate of movement should not exceed 30 per minute. As muscle tone decreases and muscle strength increases, the pace of movements and the weight of the load used increase, and previously unloaded muscle groups are included in the work. Each exercise on the block simulator must be alternated with muscle relaxation exercises and breathing exercises; the load is given first to the healthy, then to the paretic limb. With concomitant cardiovascular pathology, loads are initially assigned only to the distal parts of the limbs, since movements in small joints have almost no effect on general blood circulation. As adaptation to physical activity increases, movements in the large joints of the limbs are included.

*Isokinetic apparatus* is an electromechanical device that operates at a given speed. The patient presses on the levers of the device with a certain force, and resistance arises in response (Fig. 11).



Fig. 11. Isokinetic device with biofeedback

The greater the patient's strength, the more resistance he encounters. The duration of classes of this type is 15–20 minutes, daily or every other day.

Training using such devices is indicated for patients with impaired fine motor skills of the distal upper limbs. Isokinetic devices are mechanized devices for restoring active movements in the fingers, including the thumb, and allow you to work simultaneously with all fingers, sequentially or separately with each finger. The devices allow for an objective assessment of isometric strength, range of motion, presence of spasms, adjusted to individual characteristics, allows you to evaluate the progress of the treatment. It should be noted that inpatient healthcare institutions for early rehabilitation of patients with stroke are well equipped with robotic mechanical simulators. Many institutions have equipment for locomotor training, both passive and active (Fig. 12). For example, the **Lokomat** rehabilitation complex, equipped with biofeedback, a system for unloading the patient's weight, is designed to restore walking skills; the therapeutic system unloads the patient's weight while walking, and additionally unloads the muscles of the lower extremities. Promotes verticalization of the patient, strengthening of afferentation processes. Designed to restore and form correct gait. It is used at all stages of rehabilitation.



*Fig. 12. Lokomat rehabilitation complex*

At this stage, ergotherapy (activities aimed at developing fine motor skills), physiotherapeutic methods, classes with a speech therapist and psychologist.

### **OCCUPATIONAL THERAPY**

Occupational therapy is healing through activity. This application of methods and tools aimed at developing fine motor skills, which can improve everyday adaptation of patients who have suffered a stroke, restore motor activity of the upper extremities with the help of various exercise equipment and game tasks, adapt a person to normal life, help him achieve maximum independence and independence in everyday life and, as a result, improve quality of life. In our country, many early rehabilitation hospitals have created and successfully operate occupational therapy rooms.

The success of occupational therapy also depends on the active participation of patients' relatives, who are taught methods of using early medical rehabilitation.

### **PHYSIOTHERAPY TECHNIQUES**

**The purpose of physiotherapy:** to provide anti-inflammatory and resorption effect in the area of the lesion, improve cerebral hemodynamics, restore liquor dynamics, movement in paretic limbs, reduce the severity of aphathic, vegetative-trophic disorders, prevent the development of contractures and severe spasticity.

In the **early recovery period** of stroke, in the absence of contraindications to physiotherapy, can be used:

**Pharmaceutical electrophoresis** is a combined effect on the body of direct electric current and the drug substance administered by means of it. Drug substances in solution dissociate mainly into ions and charged hydrophilic complexes. When such solutions are placed in a constant electric field, the charged particles contained in the solutions move towards the opposite poles (electrophoresis), penetrate deep into the tissues and have a therapeutic effect. The proportion of the drug substance penetrating the body by electrophoresis is 5–10 % of the drug used in the procedure.

The advantages of the drug electrophoresis method are:

- creation of a skin depot, in which the drugs are found from 3 to 21 days;
- the impact occurs directly on the pathological focus;
- administered drugs practically do not cause adverse reactions;
- painless introduction of drugs;
- non-invasiveness of the method;
- absence of generalized allergic reactions.

Contraindications: neoplasms or suspected of them, acute inflammatory and purulent processes, systemic blood diseases, sharply expressed atherosclerosis, decompensation of cardiac activity, fever, eczema, dermatitis, extensive violations of the integrity of the skin and skin sensitivity disorders in places where the electrodes are applied, pregnancy, cachexia, individual intolerance to galvanic current and drugs.

Appointed: electrophoresis of nicotinic acid, eufylline, papaverine, acetylsalicylic acid, magnesium sulfate, dimexide, novocaine, platifylline on the eye-occipital method or on the collar zone. Current density — 0,01 mA/cm<sup>2</sup>. Duration of the procedure — 15–20 min. Course of treatment — 10–12 procedures daily. Repeated courses of treatment at intervals of 1–1.5 months are recommended.

**Electrostimulation** — application of electric current to stimulate motor nerves and muscles, to a somewhat lesser extent — internal organs, by exposing the human body to electric current with specified characteristics through contact applied electrodes.

Contraindications: atrial fibrillation, polytopic extrasystole, malignant arterial hypertension, vegetovascular dystonia with frequent vascular crises, acute myocardial infarction, acute period of stroke, acute period of infectious diseases, sepsis.

Electrostimulation is performed with sinusoidal modulated currents after electrodiagnosis and setting the parameters of electric current in each patient individually. It affects the antagonist muscles of spastic musculature (method of Prof. G. E. Bagel). The course of treatment — 20 procedures, daily. Repeated courses are carried out in 3-4 weeks at subsequent stages of medical rehabilitation.

The effect is applied to the following motor points:

- 1st field — supraspinous muscle — lateral abdomen of the deltoid muscle;
- 2nd field — deltoid muscle — triceps muscle of the shoulder;
- 3rd field — ulnar extensor of fingers — common extensor of fingers;
- 4th field — quadriceps femoris muscle — the place where the muscle transitions into a tendon;
- 5th field — peroneal nerve — tibialis anterior muscle.

Variable mode, operation type II, frequency — 150–100 Hz, modulation depth — 75 %. Duration of sends and pauses — 2–3 s each. Current strength — until a typical physiological contraction of medium strength (30–40 mA) is obtained. Duration of exposure to the field — 2–3 min 2–3 times with an interval of 1 min. When performing electrostimulation, it is necessary to carefully select motor points to avoid increasing spasticity.

It is advisable to combine electrostimulation with selective massage of antagonists of spastic muscles of paretic limbs, acupressure. The course of treatment is 10–15 procedures, daily.

**Magnetotherapy** is one of the gentlest and easily tolerated methods of physical treatment. Without causing pronounced subjective sensations, shifts in central hemodynamics and thermal effects, magnetotherapy can be actively used in patients with concomitant pathology and more severe course of the underlying disease. Among the methods of magnetotherapy the most common is low-frequency magnetotherapy, its main therapeutic effects are vasoactive, anti-inflammatory, anti-edema, hypotensive, trophic, hypo coagulating, neurotropic. The action of magnetic fields has a trace character. After a single exposure, some reactions of the organism or individual systems persist for 1–6 days, and after the course — persists up to 2 or more months.

The most sensitive to low-frequency magnetic fields are the nervous, endocrine and cardiovascular systems. Low-frequency magnetic field has a predominantly excitatory effect on the peripheral nervous system. Under the influence of magnetic fields increases the speed of impulse conduction along nerve fibers, increases their excitability, reduces perineural edema, normalizes the activity of the autonomic nervous system, there is a favorable effect on cerebral blood circulation and recovery processes in stroke.

Patients easily tolerate magnetotherapy procedures. Adverse local reactions are relatively rare during magnetic field treatment.

Contraindications to the appointment of low-frequency magnetotherapy are the following diseases and conditions: severe hypotension, acute psychosis, diencephalic syndrome, early postinfarction period, the presence of implanted pacemakers, individual intolerance to the factor, bleeding or suspected bleeding.

In the case of stroke, alternating magnetic field is used (devices “Unispok”, “Polyus-1”, “Magniter”, “AMT-01”) paravertebrally on the area of projection of

lower cervical-upper thoracic segments and on the focus of the lesion. Inductor is rectangular or cylindrical. Magnetic induction — 19–25 mTl. Duration of exposure — 6–15 min. Course of treatment — 8–10 procedures, daily or every other day.

In case of increased muscle tone tendency to form muscle contractures and pain syndrome, **paraffin or ozokerite applications** (48–52 °C) on paretic limbs and joints are indicated. Duration of exposure — 10–15 minutes. Treatment course — 8–10 procedures, daily or every other day.

Among the methods of **phototherapy** in the early recovery period, the use of plane-polarized light (Bioptron) on the collar and interscapular areas, paretic limbs is shown. Exposure time — 10–12 min, daily, 10–12 procedures per course of treatment.

Rehabilitation also includes drug therapy, sessions with a speech therapist and psychologist to eliminate aphasia (speech impairment) and restore the patient's memory, and the use of medical and technical rehabilitation equipment.

Among medical and technical rehabilitation devices, orthoses are used at the stage of early inpatient care (Fig. 13). An **orthosis** is a device used for fixation, unloading, correction, a lightweight structure that holds an arm or leg in the right position and helps to restore lost functions (Fig. 14). And devices on the lower limbs and trunk perform the function of a verticalizer (Fig. 15), i.e. they help a person to assume an upright position, which is more conducive to recovery after a stroke.



*Fig. 13. Orthotization of the upper limb*



*Fig. 14. Orthotization of the lower limb*



*Fig. 15.* Electrically powered verticalizer with lifting function

## **DAILY ACTIVITY TESTING**

Study of daily activities — performing the most common activities in ordinary life. As a rule, combined movements related to self-care, household and labor activities are used.

The following loads are used for the daily activity study:

- daily self-care activities;
- daily family and household activities;
- daily occupational activities.

The test results are evaluated on a 5-point scale:

- 0 points — the patient cannot perform the proposed activity;
- 1 point — the patient performs the load partially, with significant assistance;
- 2 points — the test person performs the load independently, but he/she needs the presence of an outsider to observe and control the activity;
- 3 points — the test person performs the load independently, but slowly;
- 4 points — the test person performs actions with strength, speed, agility and endurance close to normal;
- 5 points — the tested person performs the load as a healthy person, independently of bystanders.

In the study of daily activities, it is mandatory to specify the types of loads contraindicated for the patient at the time of the examination and the time required to perform the proposed activities.

The modified Functional Independence Measure (FIM) can be used to assess functional independence.

## **MEDICAL REHABILITATION EFFECTIVENESS**

When a patient is discharged from an inpatient early medical rehabilitation unit, the effectiveness of the medical rehabilitation performed, the degree of severity of functional impairments or disorders, including limitations of life activity, is assessed, and an extract from medical documents with recommendations for further medical rehabilitation is issued. at the third stage (outpatient), which is carried out in rehabilitation departments (if they are not available in specialized departments) of outpatient and polyclinic health care organizations. Such organizations include territorial city polyclinics, polyclinics of district hospitals, and medical and sanitary units of industrial enterprises for patients with mild dysfunctions, moderately pronounced, pronounced impairments, including limitations of life activity (FC 1, FC 2, FC 3), in the absence of the need for 24-hour medical supervision and the use of intensive rehabilitation methods, with the ability to move independently (or with additional means of support) and self-care, with a level of physical, mental and psychic abilities corresponding to a positive prognosis of functional recovery.

The outpatient stage of rehabilitation is a period of active recovery of motor, mental, emotional functions and skills. At this stage, an important role is played by occupational therapy, kinesotherapy (individual and group, terrenekur, Nordic walking), physiotherapy, robotic techniques. Rehabilitation also includes drug therapy, sessions with a speech therapist and a psychologist.

The following goals are achieved as a result of rehabilitation:

- restoration of motor and speech disorders;
- restoration of fine motor disorders;
- development of correct motor stereotypes;
- restoration of the ability to work and return to professional labor;
- improvement of psychological status;
- improvement of patients' quality of life.

## **SELF-CONTROL OF MASTERING THE TOPIC**

For self-checking of mastering the topic of the lesson students are recommended to answer test questions and solve situational tasks. To consolidate the acquired knowledge will help independent work on drawing up cards of individual program of medical rehabilitation of inpatients and outpatients who have suffered from stroke.



## SITUATIONAL TASKS

### Task 1

Patient M., 37 years old.

Diagnosis: stroke with marked paresis of the right arm and moderate paresis of the right leg; moderate motor and mild sensory aphasia, early recovery period.

Task: determine the rehabilitation potential:

- a) high;                      b) medium;                      c) low;                      d) doubtful.

### Task 2

Patient N., 20 years old.

Diagnosis: went to a neurologist with complaints of drooping of the right eyelid, double vision, periodic difficulties in chewing.

Task: determine the patient's management tactics:

- a) referral to the hospital, clarification of the diagnosis, selection of treatment;  
b) outpatient examination without taking time off work;  
c) outpatient examination and treatment with the determination of temporary disability.

### Task 3

Patient S., 67 years old.

Diagnosis: cerebral infarction in the right carotid system, early recovery period, moderate spastic left-sided hemiparesis?

Task: determine what functional class the motor disorders correspond to:

- a) FC 0;                      c) FC 2;                      e) FC 4.  
b) FC 1;                      d) FC 3;

### Task 4

Patient M., 57 years old.

Diagnosis: brain infarction in the left carotid system, early recovery period, moderate motor aphasia, marked left-sided hemiparesis.

Task: determine which functional class the speech disorders belong to:

- a) FC 0;                      c) FC 2;                      e) FC 4.  
b) FC 1;                      d) FC 3;

### Task 5

Patient S., 50 years old.

Diagnosis: brain infarction in the left carotid system with moderate right-sided hemiparesis, mild motor aphasia, early recovery period.

Task: choose the optimal methods of physiotherapy:

- a) heat treatment, massage, electrophoresis of vascular drugs, reflexotherapy;

- b) heat treatment, massage, electrophoresis of vascular drugs, electrical stimulation;
- c) cryotherapy, massage, magnetotherapy, electrical stimulation.

**Answers to the tasks:** 1 — c; 2 — a; 3 — c; 4 — d; 5 — b.

## **TESTS**

**1. In what diseases can heat treatment be prescribed?**

- a) ovarian cyst;
- b) traumatic injury of the elbow joint;
- c) acute hidradenitis;
- d) cerebral infarction.

**2. Which of the following conditions is a contraindication for referral for rehabilitation?**

- a) seizures of medium frequency;
- b) pronounced sensory-motor aphasia;
- c) motor disorders of FC 4;
- d) thromboembolic disease.

**3. Selection of neurological patients for further medical rehabilitation in hospital is carried out by:**

- a) medical advisory board;
- b) rehabilitation doctor of the outpatient clinic;
- c) attending physician;
- d) head of the medical rehabilitation department.

**4. In a patient with cerebral stroke consequences high, uncorrected arterial hypertension is:**

- a) indications for MR;
- b) contraindications for MR;
- c) indications for active MR with simultaneous treatment.

**5. Whose responsibilities include drawing up an individual rehabilitation plan for a disabled person due to a neurological disease?**

- a) a neurologist;
- b) a rehabilitation physician;
- c) medical advisory board of a polyclinic;
- d) medical rehabilitation expert commission.

**6. Which of the following diseases is not an indication for referral to rehabilitation?**

- a) discogenic radiculitis L-S, moderate persistent pain and reflex-tonic syndrome;
- b) cerebral palsy, hemiparetic form, late residual period;
- c) progressive chronic circulatory insufficiency stage 2.

**7. If the patient has full range of motion under the action of gravity and with a small external counteraction, the ratio of muscle strength of the affected and healthy limb is 75 %. The degree of paresis is determined:**

- a) absent;
- b) mild;
- c) moderate;
- d) pronounced;
- e) gross;
- f) paralysis.

**8. In a patient with the consequences of cerebral stroke pronounced mental disorders are:**

- a) indications for MR;
- b) contraindications for MR;
- c) indications for active MR with simultaneous treatment.

**9. In a child with the consequences of traumatic brain injury pronounced mental disorders are:**

- a) indications for MR;
- b) contraindications for MR;
- c) indications for active MR with simultaneous treatment.

**10. Rehabilitation, unlike treatment, is primarily based on:**

- a) nosologically diagnosis;
- b) syndromologically diagnosis;
- c) functional diagnosis.

**11. Rehabilitation, as opposed to treatment, is aimed at:**

- a) fighting the disease;
- b) eliminating the cause of the disease;
- c) mobilizing the body's defense mechanisms.

**12. Who is responsible for referring a patient to an inpatient medical rehabilitation department?**

- a) the attending physician;
- b) a rehabilitation physician of a polyclinic;
- c) the head of a department of a polyclinic;
- d) the medical advisory board.

**13. The goal of medical rehabilitation is:**

- a) restoration of health;
- b) restoration of the patient's abilities and social adaptation;
- c) restoration of impaired function;
- d) clinical recovery.

**14. In what period of the disease do rehabilitation measures begin?**

- a) in the acute period;
- b) in the subacute period;
- c) after discharge from the hospital;
- d) after determination of the disability group.

**15. Which of the following conditions is included in the list of contraindications to medical rehabilitation?**

- a) impossibility of contact with the patient;
- b) acute period of the disease;
- c) pronounced functional defect;
- d) psychological and speech disorders.

**16. An individual rehabilitation program for a disabled person is drawn up in the presence of indications:**

- a) on a mandatory basis;
- b) at the doctor's request;
- c) on the instructions of the chairman of the deputy chief physician for medical rehabilitation expert commission;
- d) at the request of the disabled person.

**19. Patients of what age are not subject to medical rehabilitation?**

- a) under 1 year of age;
- b) over 60 years of age;
- c) with signs of disability;
- d) all are subject to it.

**20. The concept of disease consequences describes impairments at:**

- a) 4 levels;
- b) 3 levels;
- c) 2 levels.

**21. List the disabilities outlined in the international classification of the consequences of the disease:**

- a) mobility, self-care, orientation, communication, ability to learn, ability to work;
- b) mobility, self-care, orientation, communication, control over one's behavior, ability to learn, ability to work;
- c) mobility, self-care, orientation, control over one's behavior, ability to learn, ability to work.

**22. List the types of functional impairment following illness or injury as outlined in the International Classification of the Consequences of Disease:**

- a) mental, auditory-vestibular, visual, visceral, metabolic, motor, speech, visceral, motor, general disabilities;
- b) mental, mental, other psychological, language, speech, auditory, auditory-vestibular, visual, visceral, metabolic, motor, general disabilities, disfiguring;
- c) auditory, auditory-vestibular, visual, mental, mental language, auditory, visual, cardiovascular, respiratory, musculoskeletal, gastrointestinal, renal, general disorders, disfiguring.

**23. Which of the following is an anatomical defect?**

- a) total removal of the stomach;
- b) resection of a lobe of the lung;
- c) removal of a kidney.

**24. Which period of rehabilitation does not exist?**

- a) early rehabilitation of the patient;
- b) rehabilitation of the patient;
- c) early rehabilitation of the disabled person;
- d) rehabilitation of the disabled person.

**25. Which stage is absent in the rehabilitation process?**

- a) rehabilitation diagnosis;
- b) rehabilitation impact;
- c) rehabilitation treatment;
- d) post rehabilitation support.

**Answers to the tests:** 1 — d; 2 — d; 3 — a; 4 — b; 5 — d; 6 — c; 7 — b; 8 — b; 9 — b; 10 — c; 11 — c; 12 — d; 14 — c; 15 — a; 16 — a; 17 — a; 18 — d; 19 — b; 20 — b; 21 — b; 22 — a; 23 — c; 24 — c.

## LITERATURE

1. *Latysheva, V. Ya.* Neurology and surgery : a textbook for 4-6 year students of medical, pediatric, medical diagnostic faculties of medical universities, clinical residents, graduate students and beginning neurologists / V. Ya. Latysheva, B. V. Drivotinov, M. V. Olizarovich. Gomel : GOMSMU, 2018. 440 p.

2. *Smychek, V. B.* Fundamentals of the ICF / V. B. Smychek. Minsk, 2015. 432 p.

3. *Kalenchits, T. I.* Functional stress tests: teaching manual / T. I. Kalenchits, E. V. Rysevets, J. V. Antonovich. Minsk : BGMU, 2018. 36 c.

4. *Movement recovery after post-stroke* (Electronic resource) / MEDBE. RU. Mode of access: <https://medbe.ru/materials/reabilitatsiya-posle-insulta/vosstanovlenie-dvizheniy-posle-insulta>. Date of access: 05.03.2024.

**ASSESSMENT OF FUNCTIONAL STATUS  
IN NEUROLOGICAL DISORDERS**

**Motor disorders**

Type of study	Functional class				
	FC 0	FC 1 mild impairment	FC 2 moderate impairment	FC 3 severe impairment	FC 4 acute or total impairment
Degree of paresis	No	Lightweight	Moderate	Expressed	Sharp
Traffic volume	No irregularities	Full or nearly full range of motion (100–75 %)	Limited traffic volume (75–50 %)	Active movements in conditions, volume of movements (25–50 %)	Active movements are absent and/or movements of some muscle groups are possible (0–25 %)
Muscular strength	Normal	Decrease in muscle strength (up to 4 points) with overcoming external resistance	Moderate decrease in muscle strength (3 points), difficulty in overcoming external resistance	Significant decrease in muscle strength (2 points), ability to overcome external resistance is very weak	Pronounced decrease in muscle strength to 1 or 0 points, possible feeling of muscle tension
Muscle tone	Unchanged	Mild increase in muscle tone (slight resistance to movement)	Moderate increase in muscle tone (tone is increased, but resistance is not difficult to overcome)	Significant increase in muscle tone (muscle resistance is difficult to overcome)	Sharp increase in muscle tone, passive movements are limited or almost impossible

Type of study	Functional class				
	FC 0	FC 1 mild impairment	FC 2 moderate impairment	FC 3 severe impairment	FC 4 acute or total impairment
Reflexes	Normal	Anisoreflexia	Anisoreflexia, persistent pathologic reflexes.	Sharply pronounced anisoreflexia, well-defined foot clonus and pathologic reflexes	Sharp anisoreflexia, pathologic reflexes, clonus.
Walk	There's no change in gait	Limp on the paretic leg	Hemiparetic gait	Circumambulatory gait	Circumductive gait, or the patient does not move independently

### Voice and speech disorders

Type of study	Functional class				
	FC 0	FC 1 mild impairment	FC 2 moderate impairment	FC 3 severe impairment	FC 4 severely or completely collapsed
<i>Motor aphasia</i>					
Oral speech	No irregularities	Slowed down, mild vocabulary restriction	Limited, simple sentences are used	Single words are used	Abruptly disturbed, speech embolus may be present; facial expressions and gestures are used in communication; comprehension is impaired

Type of study	Functional class				
	FC 0	FC 1 mild impairment	FC 2 moderate impairment	FC 3 severe impairment	FC 4 severely or completely collapsed
Active vocabulary	No violations	Slang	Slurred words	Use of primitive phrases is possible, use of prepositions is difficult; agrammatism	–
Speech activity	No violations	Satisfactorily	Reduced	Significantly reduced	–
<i>Sensory aphasia</i>					
Speech understanding	No violations	Relatively fluent, comprehension of extended text is difficult	Situational	Extremely limited; understandable situational speech, close to the patient in subject matter	Absent
Speech understanding	No violations	Can be difficult in complex environments	There are errors: naming of separate objects, alienation of word meaning, paragnosias	Gross alienation of the meaning of the word when showing various objects	–
Following verbal instructions	No violations	Execute	Misfire	Are grossly distorted	Fall behind



Application to the order  
of the Ministry of Health  
of the Republic of Belarus  
23.10.2009  
N 998 Form 7-mse/u-09

**INDIVIDUAL PROGRAM  
OF MEDICAL REHABILITATION OF PATIENT N \_\_/\_\_/\_\_ \***

1. Patient's last name, first name, middle name \_\_\_\_\_
2. Date, month, year of birth " \_\_ " \_\_\_\_\_ 20\_\_.
3. Place of residence (stay) \_\_\_\_\_  
\_\_\_\_\_ contact phone number \_\_\_\_\_
4. Place of work (service, study) \_\_\_\_\_
5. The rehabilitation program was drawn up: for the first time, repeatedly (underline required).
6. Period of validity of the medical rehabilitation expert commission opinion from " \_\_ " \_\_\_\_\_ 20\_\_ to " \_\_ " \_\_\_\_\_ 20\_\_.
7. Code of the main disease according to the International Classification of Diseases \_\_\_\_\_
  - 7.1. major disease \_\_\_\_\_  
\_\_\_\_\_
  - 7.2. concomitant diseases, complications \_\_\_\_\_  
\_\_\_\_\_
8. Continuous temporary disability at the time of formation of this program (days) \_\_\_\_\_
9. Disability group (degree of loss of health) \_\_\_\_\_

## 10. Disabilities of life

Life activity categories	Functional class			The effect of rehabilitation is clinical
	before rehabilitation	after rehabilitation	functional class	
Ability to move				
Self-care ability				
Ability to communicate				
Orientation ability				
Controlling your behavior				
Learning ability				
Ability to work				

11. Purpose of rehabilitation: restoration of life activity limitations (full, partial); restoration of social and domestic activity (full, partial); restoration of working capacity (full, partial); compensation of life activity limitations with technical means of social rehabilitation (underline required).

12. Rehabilitation potential: high, medium, low (underline).

13. The scope of rehabilitation medical care:

№ п/п	Methods of rehabilitation	Assigned	Done
1	Psychotherapy		
2	Therapeutic exercise		
3	Apparatus physiotherapy		
4	Hydrotherapy		
5	Heat treatment		
6	Massage		
7	Reflexology		
8	Speech therapy		

<b>№ п/п</b>	<b>Methods of rehabilitation</b>	<b>Assigned</b>	<b>Done</b>
9	Reconstructive surgery and prosthetics		
10	Patient «school»		
11	Other methods		
12	Technical means of social rehabilitation (hereinafter — TMSR) provided by health care authorities	Determined by the individual rehabilitation program of a disabled person or medical opinion of the medical advisory board	Date of fulfillment
12.1	dental prostheses		
12.2	hearing aids		
12.3	eye prostheses and glasses		
12.4	TMSR for diabetics		
12.5	TMSR for stoma patients		
12.6	others		

14. Full implementation of the individual rehabilitation program: fully implemented, partially implemented, not implemented (underline required).

15. Reasons for not fulfilling the individual rehabilitation program: patient's refusal, other (specify) \_\_\_\_\_

16. Final recommendations: needs: continuation of medical rehabilitation in outpatient (inpatient) conditions, at home; referral to medical advisory board to determine the need for technical means of social rehabilitation; other (specify) \_\_\_\_\_

Date “\_\_” \_\_\_\_\_ 20\_\_.

Specialist doctor responsible for drawing up this program \_\_\_\_\_

(surname, initials) (signature)

\* To be completed by the health care organization in cases of medical rehabilitation of patients with signs of disability (before they are referred for medical and social expert assessment) or when the medical and rehabilitation expert commission issues a conclusion for the health care organization at the place of residence of the disabled person on the formation of an individual medical rehabilitation program.

## ОГЛАВЛЕНИЕ

List of abbreviations .....	3
Motivational characteristics of the topic.....	3
Introduction.....	5
Principles of medical rehabilitation .....	6
Goal and tasks .....	6
Means of medical rehabilitation.....	7
Medical rehabilitation at the inpatient stage .....	8
Treatment by position .....	9
Stage of early inpatient medical rehabilitation .....	12
Mechanotherapy.....	14
Occupational therapy.....	18
Physiotherapy techniques.....	18
Daily activity testing.....	22
Medical rehabilitation effectiveness .....	23
Self-control of mastering the topic .....	23
Situational tasks .....	24
Tests .....	25
Literature.....	28
Application 1 .....	29
Application 2.....	32

Учебное издание

**Малькевич** Людмила Антоновна  
**Чешик** Ольга Олеговна  
**Лемешевский** Иван Александрович

**МЕДИЦИНСКАЯ РЕАБИЛИТАЦИЯ  
В РАННЕМ ВОССТАНОВИТЕЛЬНОМ ПЕРИОДЕ  
ОСТРОГО НАРУШЕНИЯ МОЗГОВОГО КРОВООБРАЩЕНИЯ**

**MEDICAL REHABILITATION IN THE EARLY RECOVERY  
PERIOD OF ACUTE CEREBRAL CIRCULATION DISORDER**

Учебно-методическое пособие

На английском языке

Ответственная за выпуск Л. А. Малькевич  
Компьютерная вёрстка О. В. Лавникович

Подписано в печать 19.11.24. Формат 60×84/16. Бумага писчая «Хероx Марафон Бизнес».

Ризография. Гарнитура «Times».

Усл. печ. л. 2,09. Уч.-изд. л. 1,69. Тираж 50 экз. Заказ 644.

Издатель и полиграфическое исполнение: учреждение образования  
«Белорусский государственный медицинский университет».  
Свидетельство о государственной регистрации издателя, изготовителя,  
распространителя печатных изданий № 1/187 от 24.11.2023.  
Ул. Ленинградская, 6, 220006, Минск.