LVIV NATIONAL MEDICAL UNIVERSITY N.A. DANYLO HALYTSKY

Department of Physical Training and Sports Medicine

Approved at the methodical meeting of
the department of Physical training and sports medicine
Head of the department
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Protocol № 18 from 26.05 2023

GUIDELINES

in the discipline

PHYSICAL REHABILITATION AND SPORTS MEDICINE

for 4th year students

training of specialists of the second (master's) level higher education in the field of knowledge 22 "Health" specialty 222 "Medicine" for independent work in preparation for practical classes

Topic 9 *"Physical rehabilitation in diseases and injuries of the nervous system."*

LVIV-2023

Methodical guidelines are made in accordance with the requirements of the curriculum in the discipline "Physical Rehabilitation and Sports Medicine", compiled to train specialists of the second (master's) level of higher education in the field of knowledge 22 "Health" specialty 222 "Medicine".

According to the curriculum, the study of physical rehabilitation and sports medicine at the medical faculty is carried out in the 4th year of study. The program is designed for 75 hours, of which 30 classroom hours (practical classes), 8 hours - lectures and 37 hours of independent work of students (IWS).

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According to the general wording of the head of the Department of Physical Education and Sports Medicine, Candidate of Biological Sciences, Associate Professor O.B. Kunynets.

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Methodical recommendations were discussed and approved at the methodical meeting of the Department of Physical Education and Sports Medicine

Protocol № 18 from 16 of May 2023

1. **Relevance of the topic**. Vascular diseases of the brain occupy a leading place among diseases of the nervous system and are a common cause of death, temporary or permanent loss or disability. The leading symptoms that determine the disability of patients with residual stroke are almost always movement and speech disorders. Therefore, in the treatment of patients with the consequences of stroke, the main attention should be paid to these disorders. A few days after the stroke, the muscle tone of the paralyzed limbs begins to recover. At the same time, the tone of the flexor muscles increases in the arm and the extensor muscles in the leg, which leads to the appearance of the characteristic Wernicke-Mann posture. Uneven increase in the tone of flexor and extensor muscles further leads to the formation of flexion contractures in the joints of the arm and extensor - in the joints of the leg. Restoration of muscle tone is combined with increased tendon and periosteal reflexes and expansion of reflexogenic zones. Along with the increase of reflexes there is a violation of them, there are protective reflexes, synkinesis. Peripheral paralysis - damage to a peripheral neuron at any level - is accompanied by motor, reflex and trophic disorders. FR in the neurological clinic - the main method of rehabilitation therapy.
2. **The duration of the topic** is 2 hours.
3. **The educational purpose of the lesson**

Get acquainted, have an idea of the clinical and functional justification of FR in diseases of the central and peripheral nervous system.

Know: the reasons that contribute to the formation of musculoskeletal contractures in central and peripheral paralysis (paresis), the mechanisms of action of FR drugs on muscle agonists and antagonists; principles of posture in the treatment of position.

Be able to use passive movements in the upper and lower extremities; massage techniques according to the tone of muscle agonists and antagonists; to determine the effect of the use of FR in complex treatment.

Master the skills of descriptive and demonstrative provision of corrective provisions, performance of passive and active special exercises, operational control of the adequacy of physical activity in patients with diseases of the central and peripheral nervous system.

4. **Basic knowledge, skills, abilities necessary for studying the topic (interdisciplinary integration)**

Anatomy- knowledge of the anatomy of the musculoskeletal, cardiovascular, respiratory, digestive, nervous systems. Be able to determine the correctness of the body structure, posture, the integrity of the skin.

Biochemistry - understand the role of surfactant and respiratory proteins in adapting to exercise, biochemical changes in muscle function.

Normal physiology - features of the physiological state of the organism after exposure to normal physical activity. Analyze the physiological constants of muscle work, the state of the body's enzyme system. Determine the change in heart rate, blood pressure, BCC, FFD.

Pathological physiology- to evaluate the physiological state of the organism after the action of physical activity on it in pathological conditions, to interpret changes in the general analysis of blood after physical activity. Be able to detect clinical manifestations of acute overexertion, chronic fatigue of varying severity.

5. Student advice.

5.1. OBJECTIVIZATION OF MOTOR DISORDERS IN PRIMARY CONTROL FOR THE SELECTION OF ADEQUATE MEANS FR

Muscle strength is assessed in points:

• 0 - muscle tension on palpation is not determined;

• 1 - muscle tension is determined by palpation;

• 2 - denervated muscles move a segment of the limb in the horizontal plane with;

• 3 - muscle tension without assistance;

• 4 - muscle tension with overcoming resistance;

• 5 - denervated muscles move the limb segment from the bottom up without assistance;

6 - muscle tension with overcoming resistance

Muscle tone is determined by:

• palpable and comparable to healthy limbs;

• myometrium - the appearance of indentation in the muscle when applying a certain load;

• mutonometry - values of the mutonometer;

• resistance to passive movement (with increased tone -by type "gears" or "Folding knife", at low tone - reduction or absence of resistance)

The amplitude of movements in the joints of denervated limbs is determined by angleometry

Atrophy of the musculoskeletal system is determined by:

• visually;

• palpation;

• measuring girths and comparing them in dynamics

Reflexes (normal and pathological) and synkinesis (global and imitative) Ability to perform household skills.

SPECIAL TASKS THAT NEED TO BE SOLVED BY FR MEANS

At defeats of the central nervous system

• Elimination of muscular dystonias in order to prevent muscle contractures, eliminate overstretching of peripheral nerves

• Prevention of the appearance or reduction of the severity of pathological deep reflexes, synkinesis; trophic changes in muscles, ligaments, fascia, aponeurosis, articularrhon, cartilage; musculoskeletal contractures, forced position of the extremities

• Preservation of functional mobility of joints in denervated extremities

• Stabilization of balance, improvement of coordination with differentiation of substitute and purposeful movements

At defeats of peripheral nervous system

• Elimination of muscular dystonias: prevention of muscle contractures, elimination of overstretching of peripheral nerves

• Prevention of the appearance or reduction of the severity of trophic changes in muscles, ligaments, fascia, aponeurosis, joint surfaces, cartilage; musculoskeletal contractures, forced position of the extremities

• Preservation of functional mobility of joints in denervated extremities

At defeat of roots of a spinal cord

• Reduction or removal of axial load on the spine
• Muscle relaxation with increased tone
• Normalization of muscle imbalance, creation of a muscular corset

FR MEANS, FORMS, METHODS AND DOSAGE OF PHYSICAL LOADS

At defeats of the central nervous system

Motor mode - bed strict with its gradual expansion

Corrective positions of the extremities, opposite to the Wernicke-Mann position

Active exercise in full healthy limbs in the form of therapeutic gymnastics

Passive physical exercises for denervated extremities in the form of therapeutic gymnastics:

- perform separately in each joint;
- start with small joints;

accompany them with detonating massage - stroking, light rubbing, shaking - and ideomotor exercises

Intensity of physical activity:

- should not cause hemodynamic changes (increased heart rate)

Duration and frequency of physical activity: in the following periods of treatment it is possible to activate up to 50% of a chronotropic reserve 2 - 5 times a day depending on a motor mode.

GENERAL TASKS THAT NEED TO BE SOLVED BY FR MEANS

• Prevention of congestive pneumonia
• Prevention of bedsores
• Prevention of trophic changes in the skin of the affected extremities
• Restoration of household skills, preservation of functional fullness of healthy extremities
• Improving the psycho-emotional state of the patient

Methods of exercise therapy in the treatment of traumatic brain injury

Traumatic brain injury may be accompanied by:

• concussion
• bruising
• squeezing
• brain damage

Clinical periods:

• 1st period - prescribe rest, conduct medical and surgical treatment, treatment position;
• 2nd period - appoint extended bed rest (2a -2b) and ward modes.

The purpose of exercise therapy for traumatic brain injury:

• Activation of vital functions of the cardiovascular, respiratory and digestive systems;
• prevention of stagnation in the lungs, bedsores;
• improvement and restoration of vestibular function;
• increase the overall tone of the body.

Means of exercise therapy in the treatment of traumatic brain injury in the 2nd period

• ThG with insignificant physical activity from the initial position lying down or sitting;

• simple exercises with a change in body position;
• head movements in the lateral and anteroposterior planes with limited amplitude;
• performing exercises for coordination of movements, exercises for the tongue, lower jaw and facial muscles;
• breathing exercises with exhalation.

Tasks of exercise therapy in the 3rd period of treatment of traumatic brain injury

• Restoration of vestibular function;
• normalization of the function of external respiration;
• general tonic effect;
• recovery of walking skills;
• improving the mental state of the patient.

Means of exercise therapy in the treatment of traumatic brain injury in the 3rd period.

During this period, gradually complicate the method of training, allow breathing exercises with load and amplitude of movements, gradually increasing, appoint head movements in different planes with full amplitude, torso rotation in full and in different directions, as well as exercises in balance on a large and small plane of resistance, in throwing medium and small balls. Prescribe exercises with eyes closed on the spot and with movement, teach to walk with and without safety, recommend walks in the fresh air, games on the spot and relay type in alternation with breathing exercises.

Basic methodological principles of exercise therapy in patients with contusion and concussion of the brain

In the 2nd period of treatment the greatest value should be given to general strengthening exercises, and also special exercises for the vestibular device. Exercises with changing the position of the head (tilts, turns) are complicated by gradually increasing the amplitude of head movements, and exercises in balance should be performed on a wide plane of resistance and alternate them with exercises in a sitting position. Exercises with closed eyes are especially carefully prescribed. During all exercises it is necessary to provide full insurance of the patient. In the 2nd period it is recommended to perform exercises in throwing with a big ball, and in the 3rd - throwing methods complicate and use small rubber balls.

Exercise therapy in the treatment of diseases and injuries of the peripheral nervous system

There are the following types of diseases of the peripheral nervous system:

• sciatica;
• neuritis;
• plexitis;
• polyneuritis.

The purpose of exercise therapy in diseases of the peripheral nervous system

• Improve blood circulation and trophic processes in the affected area, help eliminate vascular and trophic disorders;
• Intensify the resorption of residual effects of the inflammatory process (prevention of adhesions and scarring);
• Strengthen the paretic muscles and ligaments;
• Prevent muscle atrophy and stiffness in the joints;

• Develop and improve substitution movements and coordination of movements;
• Counteract the curvature of the spine and limit the mobility of the spine;
• Have a healing effect on the patient's body.

Basic methodological principles of exercise therapy

1. Choice of painless starting position - with the help of optimal starting positions to identify arbitrary movements and develop existing active movements (this requires contraction of the paretic muscles and stretch their antagonists);

2. To develop mobility in joints, to increase muscular force, to increase an organism tone and to develop skills of applied value by means of special physical exercises, gradually to develop motor skills;

3. Exercises should be performed unsharply, the amplitude of movements should be increased gradually with the help of fluffy movements without weighting;

4. Do not bring tense muscles to a state of severe fatigue, alternating general developmental exercises with special ones;

5. Stretching of contracted muscles to achieve exercises with weights;

6. Necessary independent classes 1-5 times a day, along with exercise apply balneophysiological procedures

Means of exercise therapy in diseases of the peripheral nervous system

The main starting and at the same time unloading positions for performing ThG exercises in patients with lumbosacral radiculitis are knee-elbow or knee-knee wrist, lying on his back, lying on his side, and in the case of cervical and thoracic sciatica - sitting, standing with his hands on.

Exercise therapy in the treatment of facial nerve neuritis

Complex treatment: special position (adhesive plaster mask), therapeutic facial exercises (from the 6th to the 10th day of the disease), massage, physiotherapy procedures.

Means of exercise therapy in the treatment of facial nerve neuritis

• Passive-active exercises for facial muscles;
• The pace of exercise is slow or medium;
• Each exercise is repeated 10-15 times at the beginning of the course, then the number of repetitions is increased daily by 3-5 and gradually increased to 30-40 times.

Special exercises begin with the simplest movements of facial muscles

• Use articulatory movements of the lips, starting with the pronunciation of vowels a, y, and, o, etc., and then - several syllables - ma-ma-ma, chu-chu-chu, mi-mi-mi, etc .;
• The combination of the sounds b, n, c, f, c with the sounds c and y are difficult to pronounce, so it is recommended to perform these exercises in front of a mirror with the pronunciation of these sounds and syllables;
• The criterion for restoring normal lip compression is the patient's ability to whistle on exhalation and pull the lips with a tube.

5.2. Theoretical questions.

1. Name the main mechanisms of therapeutic action of exercise in diseases of the nervous system.

2. Describe the tasks of therapeutic exercise in stroke.

3. To name against indications before carrying out exercise therapy at acute disturbances of cerebral circulation.

4. Name the main mechanisms of therapeutic action of exercise in traumatic brain injury.
5. Methods of exercise therapy in the ward mode for stroke.
6. Name the tasks of exercise therapy for traumatic brain injury.
7. What exercises are recommended for patients with stroke in free motor mode?
8. What exercises are recommended for patients with traumatic brain injury in the 2nd period of treatment?
9. Name the tasks of exercise therapy for stroke in advanced bed rest.

5.3. Practical tasks performed in the classroom.

1. Be able to choose the right starting position for patients with stroke in the early recovery phase of treatment.
2. Learn to choose special treatment positions for stroke in a strictly bed rest.
3. Be able to select physical exercises for patients with traumatic brain injury.
4. Learn to compose sets of physical exercises for patients with traumatic brain injuries.
5. Learn to determine the degree of physical activity for patients with stroke.
6. Learn to compose sets of physical exercises for patients with concussion.

Situational tasks. Appendix№1
Test tasks. Appendix№2
Situational tasks.
Appendix№1

1. The duration of therapeutic exercises for paralysis in peripheral nerve damage (minutes):
A. 15
B. 20
C. 25
D. 30
E. more than 30
2. The use of local hypothermia with exercise therapy in neurological patients:
A. in flaccid paralysis
B. with flaccid paresis
C. at a spastic paralysis
D. at a spastic paresis
3. Problems of exercise therapy in motor disorders in lesions of the spinal nerves
A. restoration of active movements
B. improving joint function
C. reduction of muscle hypertonia
4. Use of medical gymnastics in water for neurologic patients
A. at a paralysis of a flaccid
B. in paresis with muscular hypertonia
C. in paresis with muscular hypotonia
D. in spastic paralysis
5. The purpose of the use of exercise therapy in cerebral palsy
A. restoration of motor function
B. restoration of mental functions
C. stabilization of motor disorders
D. prevention of progress of motor disorders

Test tasks. Appendix№2

1. In what terms appoint the expanded bed mode to patients with a stroke?

A. At a late recovery stage.

B. In the early recovery stage.

C. At the stage of residual phenomena.

D. After 1 year of recovery.

2. What determines the duration of the motor regime in the early recovery phase of patients with stroke?

A. From body temperature.

B. From the degree of motor dysfunction.

C. From the presence of deposits.

D. From the degree of brain damage.

3. Tasks of exercise therapy for patients with stroke in extended bed (II-b) mode

A. Preparing the patient for an active turn to the healthy side.

B. Preparing the patient for transfer to a standing position.

C. Improving the function of the cardiovascular and respiratory systems.

D. Improve coordination of movements.

4. Tasks of exercise therapy for patients with stroke in extended bed (II-a) mode

A. Restoration of the function of the support of the lower extremities.

B. Improving the function of the cardiovascular and respiratory systems.

C. Preparing the patient for transfer to a standing position.

D. Improve coordination of movements.

5. In what terms appoint medical massage at a stroke

A. From 2-5 weeks.

B. At the end of the first week.

C. After 3 weeks.

D. After 1 month.

6. In what terms appoint physiotherapy at a hemorrhagic stroke:

A. At the end of the first week.

B. Two weeks after the onset of the disease.

C. After 1 month.

D. Do not prescribe.

7. Under what conditions is contraindicated therapeutic massage for stroke in the early recovery period:

A. When the muscle tone of the affected limbs is not very high.

B. With increasing hemiparesis.

C. When contractures appear.

D. With muscle spasticity.

8. What exercises are used in the 3rd period of trauma:

A. Static abdominal muscle tension.

B. Exercises for balance.

C. Breathing exercises.

D. Relaxation exercises.

9. At what time for spinal cord injuries is prescribed therapeutic massage:

A. At the end of the first week.

B. From the second day.

C. In a week.

D. 30 days after the injury.

10. In what period of treatment for trauma is allowed to perform games:

A. In the 2nd period.

B. In the 3rd period.
C. Not allowed to use.
D. In 2 and 3 subject to full insurance.

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Additional

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