

# Medical Rehabilitation of Cerebral Stroke Patients

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## Abstract

The article provides methodological approaches to execution of medical rehabilitation in the Republic of Belarus and sets forth a stage-to-stage system, consisting of 5 successive rehabilitation steps. The paper lists general approaches to rehabilitation of cerebral stroke patients and 3 rehabilitation programs for such patients. The rehabilitation programs meant for minimization of disabilities in patients and their integration into the family, work collective and society.

**Keywords:** Patient; Cerebral stroke; Medical rehabilitation; Rehabilitation program

Cerebrovascular pathology is one of the most complicated and challenging problems of modern medicine. However, brain stroke is the heaviest in aspect of lethality and severity of the disabling consequences. High rates of incidence, mortality, “juvenation” of this pathology, huge material damage connected with costs of payment for temporary and permanent disability stipulate medical, social and economic importance of this problem.

The incidence of a brain stroke in the Republic of Belarus makes 291.8 out of 100 thousand inhabitants per year, mortality from all the brain stroke cases-82.0 out of 100 thousand inhabitants per year.

Neurologic rehabilitation of patients after the acute cerebrovascular event is a complex, multilateral, dynamic process which continues until the best possible recovery of the impaired physical, intellectual and mental function is reached and the patient is reintegrated into the society and if possible to his professional environment. Rehabilitation of the brain stroke patients should begin as soon as possible so that to overcome the acute consequences of a stroke, to restore functions and normal activity; at more remote stage the rehabilitation purpose is to prevent a recurrent stroke or other cardiovascular violations, as well as cases of late-onset mental depression, deterioration of ability of patients to carry out daily functions, i.e. the rehabilitation gets preventive orientation [1,2].

Basis of restoration of the impaired functions in patients with a stroke are complex changes of nervous system activity and of the body in general. In the course of restoration matters the following: injury localization (the restoration of the impaired functions is faster in the areas more remote from the affected area); the size of the affected area (the bigger the size, the more difficult the restoration); recurrence of a stroke (at repeated cerebral circulation disorders the restitution is slowed down); type of disorder (breach in cortex-subcortex interactions makes the restoration process more difficult); period of time between the stroke and beginning of restoration (the earlier appear the restitution signs, the more efficient the restoration); physical training: passive and active movements, gymnastics, etc.; logopedic work; medicines (biostimulators accelerate the restoration process); age of the patient.

Restoration of the impaired functions goes on gradually and consistently depending on a number of conditions: nature and pathway of the pathological process which caused the cerebral circulation disorder; impaired brain circulation severity; brain circulation conditions, vascular disorder dynamics in the affected area of the brain and collateral blood circulation conditions; if it is first or repeated stroke; depth of brake action, starting at the first at the cerebral cortex; conditions of the body as a whole, etc. [3].

The restorative treatment strategy is the elimination or reduction

of pathological systems, forming the persistent neurologic syndromes. These objectives can be achieved by suppression of pathological determinants, destabilization of pathological systems and activation of anti-systems that is reached either by physiological mechanisms of a sanogenesis or by pharmacological and non-drug influence. And one of the major directions in overcoming of serious consequences of a stroke is the rehabilitation allowing to reduce the severity of social consequences of a stroke and to improve quality of life of patients due to restoration of the impaired functions and abilities (criteria of activity, including working capacity), overcoming or mitigation of disability [4-6].

The main criteria of rehabilitation efficiency are: the best possible restoration of defective functions; optimal restoration of social activity (movement, self-service, orientation, communication, control of behavior); optimal possible restoration of working ability of the patient.

It is obvious that within considerable part of stroke patients it is impossible to realize these goals in full and there are objective limits of rehabilitation efficiency determined by the rehabilitation potential of the patient. Owing to this fact criteria of rehabilitation efficiency have to be differentiated depending on the rehabilitation potential [7].

Long process of the stroke patient’s rehabilitation is divided into several stages, consistently replacing each other, providing the permanence of rehabilitation process. It takes from 3-6 months up to 1-1.5 years depending on the initial state, nature and severity of the defect, rehabilitation potential and success rate of its realization. Division of the entire rehabilitation period into stages is crucially important since each of them resolves specific issues, without realization of which the transition to the following stage is inexpedient.

In the Republic of Belarus exists the landmark system of rendering rehabilitation medical care to stroke patients. It contains the following stages:

- Treatment and rehabilitation;
- Inpatient stage of early medical rehabilitation;
- Outpatient care;

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- Home care;
- Inpatient stage of repeated rehabilitation [7].

The treatment and rehabilitation stage starts at the acute phase of a stroke straight after stabilization of vital functions; it ensures execution of one of the most important rehabilitation-its early beginning.

The stage unites intensive therapy (neurometabolic protection of a brain and restoration of its normal perfusion) with consistently extending rehabilitation actions. The beginning of intensive therapy during retaining of "a therapeutic window" is essentially important. In the affected by the stroke area, in its center is located an irreversible damage zone, and in its periphery-a zone in which the nervous structures are partially retained, the so-called metabolic or ischemic penumbra. The fate of this zone hangs in the balance during the next 6 hours, making the therapeutic window. After that the cascade of pathological biochemical reactions causes death of penumbra elements. Retention of the reversibly damaged structures and restoration of their function - a restitution-provides early and the most considerable of possible functional restoration in the normal physiological way. It is the first and very essential rehabilitation mechanism.

The rehabilitation purpose at this stage is psychological and physiological preparation for active rehabilitation, early motor activation, mobilization of sanogenetic mechanisms promoting restoration of functions and prevention of life-threatening complications (pulmonary, thrombolytic, etc.) and health-threatening (bedsores), interfering with normal recovery of brain activity.

The early beginning of rehabilitation supports disinhibition and active stimulation of nervous centers that accelerates and optimizes the restitution process, creates prerequisites for its better realization.

The inpatient stage of early medical rehabilitation serves as extension to the treatment and rehabilitation stage. It is intended for patients with severe and moderate stroke in the early recovery period. The main indication for use of inpatient rehabilitation stage is the availability of rehabilitation potential, even if it is low, in patients with frank focal symptoms which lead to restriction of mobility, communication, self-service, which makes it impossible to carry out rehabilitation in the outpatient stage.

The out-patient care stage of rehabilitation is intended for the patients having average and high rehabilitation potential and for those who restored mobility in communication to the level sufficient for independent visit of polyclinic. Out-patient rehabilitation departments (undedicated) are being organized at large city polyclinics and central regional hospitals.

The home care stage of rehabilitation is intended for 2 categories of patients:

- For patients with the lowest rehabilitation potential or with its absence which are transferred to this stage upon completion of the treatment and rehabilitation phase;
- For patients having rehabilitation potential, who carry out the program of rehabilitation in home conditions in breaks between rehabilitation cycles at other stages or after their completion.

It is carried out under control of experts of an out-patient and polyclinic sector.

In cases when restoration is insufficiently active, but the patient has the rehabilitation potential, and possible restrictions of activity does not allow him to visit out-patient and polyclinic institution, the

repeated course of inpatient medical rehabilitation is appointed. In other words the patient is headed to the stage of the repeated stationary rehabilitation.

We offer approach in medical rehabilitation of patients with a brain stroke which involves allocating of rehabilitation levels depending on time passed after the acute cerebrovascular accident. The reason for this is that the successful rehabilitation of people with consequences of a stroke is only possible with deep understanding of sanogenetic mechanisms occurring after the brain accident. Sanogenetic mechanisms, as well as pathogenetic are multi-qualitative, but their essence is in their commitment to adaptation to the environment at a totally new level, because of pathological process taking place in the body in present (or in the past). Adaptation of a person is considered as a unified bio-psycho-social process which by means of various mechanisms ensures in various conditions preservation of body integration, its homeostasis, equilibration in the environment, including the social one, and the most effective activity at maximum degree of freedom in its function. This most difficult process in phylogenesis and ontogenesis is subject to rise and enhancement, and includes in particular in case of pathology various sanogenetic mechanisms. Among them are the key adaptation providing mechanisms: restitution, regeneration, compensation and readaptation [8,9].

The restitution is a process of restoration of the reversibly damaged structures activity. Restorative mechanisms are diverse and at various malconditions can be expressed as follows: 1) restoration of neurodynamic relationship; 2) reduction of pathological determinant activity; 3) elimination of a hypoxia, blood circulation restoration; 4) elimination of hydrops; 5) decompressions, etc. Restorative mechanisms are carried out in general due to restoration of permeability and excitability of membranes, normalization of intracellular oxidation-reduction processes and activation of enzymatic systems.

Regeneration is a structural and functional synthesis of continuity of body tissues and organs after their damage or partial loss. Growth and reproduction potential of the specific elements of various tissues is the cornerstone of this process.

Compensation features the process uniting various difficult and diverse reactions on functional replacement or compensation of the lost or insufficient functions.

Compensation of functions at various damages can become a factor strengthening the recovery mechanisms arising in connection with restitution, or a major factor of compensation or replacement of the lost functions. Three possible structures which provide compensation of functions: 1) the remained elements of the damaged structure; 2) the structures close in functional relation; 3) additional structures and mechanisms.

That is compensation in relation to the stroke patients in fact represents strategy of replacement and use of the remained functions (functional reorganization of the preserving formations and systems of the brain aimed to restoration of the impaired function takes place).

Finally, the readaptation in respect of rehabilitation of patients with acute cerebrovascular event constitutes adaptation of the environment to this inadequacy, use of additional resources, adaptation to the existing defect.

Thus, from the perspective of sanogenesis it is possible to consider three rehabilitation levels for the stroke patients.

The first level is restoration (whole or partial) of the impaired functions (restitution).

It is possible only if there is no total death of nerve cells, and the pathological center consists mainly of inactivated elements. Restoration is carried due to disinhibition of these inactivated elements and return of normal physiological ratios between various brain structures.

The second level is the replacement strategy, i.e., use of the remained (residual) functions (compensation).

In the process of the replacement a functional reorganization of the preserving formations and systems of a brain aimed to restoration of the impaired function takes place. Compensation of the impaired functions prevents the development of malconditions interfering with the defect devolution.

The third level is the environment adaptation to this inferiority, use of additional resources, adaptation to the existing defect (readaptation).

The rehabilitation target is to adapt a patient to self-service, to bring him back to social environment, to the society.

In spite of the fact that in each case a strictly individual rehabilitation program to be composed, the common tasks of medical rehabilitation in stroke patients within the acute period are as follows:

- Improvement of breath function and stabilization of hemodynamics; prevention and treatment of stroke complications (pneumonia, trophic disturbances, etc.);
- Development of a positive attitude to rehabilitation treatment in patients, increase of an emotional tonus, correction of psychological violations;
- Prevention of the hemiplegic contractures, decrease in a pathological muscular tonus and development of movements in joints with wide use of remedial exercises and physiotherapy;
- The logopedic help upon speech violations; training in the correct walking and elementary self-service; prevention of repeated discirculation.

Therefore, the main directions of the early rehabilitation program in the acute stroke period provide the following:

- Prevention of muscular overtone and alignment of its asymmetry;
- Prevention of steady pathological condition and pathological motive stereotypes;
- Prevention of contractures development and formation of pain syndrome;
- Development of amplitude and accuracy of movements;
- Improvement of vegetative and sensory support of motor action;
- Concentration of attention on correct and consecutive "inclusion" of muscles into the motive act;
- Correction of speech frustration and violations of swallowing;
- Neuropsychological correction in relation of both the patient, and his family;
- Personal adjustment and social integration with inclination to independent way of living;
- Prevention of complications.

Considering the above, we offer three new rehabilitation programs for stroke patients.

The first program is being realized at the first level, in the sanogenetic plan at the restitution level.

The main objective of rehabilitation at this level is prevention of the development of malconditions and complications, attaining of stabilization and regress in pathological condition. Thus the rehabilitation professional solves the following problems stated above.

Realization of rehabilitation tasks begins as early as in the acute period after stabilization of the vital functions and continues approximately for 3-4 weeks. At this time the patient is in the intensive care unit, and then in the cerebral vessels pathology unit.

At this stage it is more correct to talk not about the patient's individual rehabilitation program, but about the plan of rehabilitation integrated into the general treatment and rehabilitation system of assistance to a specific patient. It is necessary to remember that the patient's non-motility in the acute period of a stroke is the reason for development of such complications as pneumonia, bedsores, deep veins thrombosis. Increase of a muscular tonus takes place, there are problems connected with coexisting diseases (diabetes, coronary heart disease, arterial hypertension, etc.).

One more frequent phenomenon accompanying the acute period of a stroke is urinary incontinence, which in this period is observed in patients in 30-60% cases. Subsequently control of urination is more often normalized. Persisting urinary incontinence is often a bad sign in respect of function restoration forecast. The reasons for infringement of normal urination can be various: infections of urogenital ways, neurogenic dysfunction of a bladder, cognitive or sensory violations, disability of the patient owing to speech or motive frustration to call the personnel in time or to independently use the urinal.

Intestine dysfunction (tendency to coprostitia) also refers to the most frequent and can be connected with an immobilization, inadequate food, depression, cognitive frustration, impairment of consciousness. Normalization of function of pelvic organs belongs to one of the most important tasks and sometimes demands considerable efforts.

Early activation of stroke patients is necessary both for prevention of complications (pneumonia, thrombophlebitis, bedsores, coprostitia) and for faster and complete functional recovery of the patient (normalization of a muscular tonus, basic and motive abilities, communication and self-service abilities). Thus, positional treatment and passive gymnastics in case of uncomplicated ischemic stroke begins on the 2<sup>nd</sup>-4<sup>th</sup> day of the illness, in case of cerebral hemorrhage on the 6<sup>th</sup>-8<sup>th</sup> day (on condition of stable of hemodynamics and condition of patient in general). Starting from 5-6 days in case of ischemic and from 2<sup>nd</sup>-3<sup>rd</sup> week in case of hemorrhagic stroke, the patient is being trained in sitting, if his general condition and hemodynamic allows this.

Massage in absence of contraindications, begins in the same terms after the stroke, as the positional treatment, i.e., on 2<sup>nd</sup>-4<sup>th</sup> day in case of uncomplicated ischemic stroke, and on 6<sup>th</sup>-8<sup>th</sup> day in case of hemorrhage stroke.

Carrying out work on expansion of the motive mode correctly and in due time is extremely important in rehabilitation of stroke patients: a rolling (turn over) on his side from back posture with the help of a nurse or exercise physiologist (3-5 days); a lifting off the pelvis from back posture with bent and joined knee joints (3-5 days); training of the patient in walking (preliminary training of exteroceptors (3-5 day), stimulation of orthostatic function on a rotary table (5-6 days); development of walking skills: lying ("bicycle") (5-6 days), sitting (6-8 day); training in walking: rising to a standing position, standing with a

motionless bilateral support (parallel bars, backs of beds), movement between the bars, movement outside the bars, going up the steps; walking in the conditions of hydrokinesitherapy.

Thus, the rehabilitation programs offered by us at the first sanogenetic level look as follows:

### Rehabilitation program No. 1

**Sanogenetic mechanism:** Restitution

**Rehabilitation place:** Brain vessel pathology unit

**Rehabilitation purpose:** Prevention of pathological states and complications, achievement of stabilization and regress of pathological process.

#### Rehabilitation tasks:

- Early activation of patients;
- Prevention of pathological states development (spastic contractures, arthropathia) and complications (thrombophlebitis, bedsores, pulmonary engorgement) coming from hypokinesia;
- Working out of the active movements.

**Stroke period:** Acute, early recovery.

**Duration:** 2-3 weeks.

#### Rehabilitation plan:

1. Basic and differentiated therapy: neuroprotectors; vasoactive means; medications of complex vascular and metabolic action; antidepressants; histamine-like medications; neuromuscular relaxant; cholinesterase inhibitors, hypotensive, vitamins, etc.
2. Prevention of muscular tonus increase (positional treatment with corrective positioning).
3. Prevention of pulmonary engorgement (change of the patient's position each 2-3 h, airing the room, feeding side lying in a half-turn position, daily stimulating acupressure).
4. Prevention of bedsores (change of position each 2-3 h, control of cleanliness, dryness and smoothness of the bed, wiping of skin with camphoric alcohol, acupressure, uviolezing of initial skin damage).
5. Prevention of deep veins thrombosis of the lower extremities (elevation by 6-10%, passive or autokinetic movements in feet joints, early transition to a sitting position, in case of ischemic stroke-hypodermic introduction within the 2 first weeks of 5000-10000 units of heparin 2-3 times per day).
6. Combat against bladder dysfunction-retention or incontinence of urine (a catheterisation, electro stimulation, an electrophoresis of pilocarpine, etc.).
7. Combat against intestines dysfunction (enemas, diet, enough liquid, physical therapy, segmental massage).
8. Achievement of general stabilization of the patient's condition:
  - Massage with differentiated techniques,
  - Physiotherapy exercises (positional treatment, active movements with healthy extremities, movements of the extremities with myoparesis passive, active with somebody's assistance, respiratory gymnastics),

- Physiotherapeutic procedures (intravenous laser radiation of blood, ozone therapy, hyperbaric oxygenation), acupuncture.
9. Primary work on elimination of speech violations (logopedic treatment).
  10. Expansion of the motive mode: training in sitting on a bed with a support and without support under the back (vertical orientation). Preparation for training in walking. Keeping of body in vertical position.
  11. School for patients and their relatives.
  12. Training in self-service basics.

After completion of this rehabilitation program the patient has to be transferred to inpatient rehabilitation neurologic unit where the main specialist rendering help to the patient is a rehabilitation professional, who together with other members of multidisciplinary rehabilitation crew makes, corrects and estimates the results of the individual rehabilitation program.

In the early recovery period after the stroke the main emphasis is kept on active rehabilitation and achievement of best possible functional and social restoration. Along with maintenance of emotional and strong-willed stability, formation of valuable orientations and approach to life, much attention is paid to activation of substantial communication (with relatives, medical staff, patients). Implementation of these tasks demands participation of the trained psychotherapist and/or medical psychologist, and if possible - neuropsychologist.

Moreover, at this level must be solved issues of further expansion of motive mode, elimination of pathologically raised muscles tonus, increase of general social mobility and activity of the patient and elimination of other violations if available.

At the stage of improvement of the restored movement the main means of motive rehabilitation are the robot-aided mechanotherapy, classic mechanotherapy, use of various training devices, systems with biological feedback on the electroencephalogram, an electroneuromyography, posturogramma, hydrokinesitherapy, use of virtual reality.

The following three interdependent directions should be defined in the motive rehabilitation actions:

- Restoration of a pose and possibility of its active maintenance;
- Restoration of task-oriented motility;
- Increase in functional ability of a patient (tolerance to physical activities).

The important place in general rehabilitation of stroke patients belongs to physical therapy. And here should be defined three main approaches while prescribing it to stroke patients:

- Pathogenic, aimed at activation of sanogenesis process and restoration of the lost functions, correction of the main vascular disease, improvement of brain blood circulation;
- Symptomatic, helping to reduce manifestations of the main pathological process: muscular spasticity, pain syndrome, motive and trophic violations;
- Urgent, demanding correction of the accompanying pathological processes which arise acutely (thrombophlebitis, abscess, bedsores, acute respiratory viral infection, angina, etc.) or in the form of acute-on-chronic flare (chronic nonspecific disease of lungs, chronic pancreatitis, joints diseases, etc.).



The program of rehabilitation at the second level is given below:

### Rehabilitation program of No. 2

**Sanogenetic mechanism:** Compensation.

**Rehabilitation place:** Inpatient unit of medical rehabilitation, out-patient rehabilitation unit.

**Rehabilitation purpose:** Further restoration and compensation of the impaired functions.

#### Rehabilitation tasks:

1. Correction of emotional and mental disorder;
2. Expansion of motive mode with gradual increase of general mobility in patients;
3. Measures for combat against the pathologically increased tonus of spastic muscles;
4. Training of a motility of the upper extremities for the purpose to decrease the dependence on nursing care and restoration of working capacity;
5. According to individual indications – work on overcoming of other violations (speech, mental and cognitive, visual, etc.).

**Stroke period:** Early recovery.

**Duration:** Up to 2.5-3 months from the beginning of disease.

#### Individual program of rehabilitation:

1. Identification and correction of emotional, mental and psychopathological disorder: Individual active psychotherapy; collective psychotherapy; group psychotherapy; family psychotherapy; music therapy.
2. Further expansion of motive mode with gradual increase of general mobility of the patient:
  - Kinesitherapy (training of patient in sitting, standing, walking, self-service);
  - Training in vertical posture stability (balance – therapy on a post-urogramma, training in walking on moving platform, Locomat training device, neuromuscular electrostimulation);
  - Positional treatment (including with the help a removable plaster cast) to relieve the spastic muscles tonus;
  - Training in walking in the room, corridor;
  - Massage
3. Elimination of pathologically increased tonus of spastic muscles (medicamental – blockade, neuromuscular relaxants; physiotherapeutic procedure-paraffin, mineral wax, mud, etc.; autogenic training; positional treatment with corrective positioning).
4. Improvement of motive functions (the robot-aided mechanotherapy; classic mechanotherapy; use of various training devices with biological feedback according to the electroencephalogram, electroneuromyography, posturogramma; hydrokinesitherapy; physiotherapeutic procedures; massage, electrostimulation; acupuncture).
5. Restoration of function of sensory systems (visual, acoustic, tactile, etc.) as the bases for motive and cognitive consistency

of a person: ergotherapy; kinesitherapy (exercises on muscular relaxation with elements of autogenic training, exercises on improvement of movement coordination, training in correct walking, etc.); psychotherapy, massage; cognitive training; physiotherapeutic procedures; acupuncture.

6. Training in self-service skills (clothing, food, toilet, cleaning of bed, use of phone), later – work in amenity rooms, work therapy elements.
7. According to individual indications – work on overcoming of other violations (speech, cognitive, mental, visual, etc.).
8. Supporting medicamentous therapy.
9. School for patients and their relatives.
10. Assessment of professional suitability, vocational selection.
11. Solving of expert issues (determining the necessity of sending a patient to the commission of experts for defining his disability).

Many patients need to continue getting rehabilitation actions in late recovery period or a period of the brain stroke consequences. At this stage a re-socialization of patients with the purpose of reaching the social and labor status in family, society and at work, close enough to that before the stroke takes primary importance, i.e. rehabilitation in the truest sense of the word.

The main pathophysiological mechanism of gradual adaptation of the patient with residual neurologic and psychological defects to realities of life is the process of compensation and re-adaptation. Rehabilitation events in majority of cases are held in out-patient (at home, in policlinic or out-patient units) conditions.

The conditions for the patient to get outpatient rehabilitation care are as follows: Self-service and independent movement ability, stable condition of the central and brain hemodynamics and absence of the expressed cognitive violations, which could make active rehabilitation difficult.

The main tasks the rehabilitation therapists still have an out-patient stage of recovery treatment are: Prevention and treatment of complications and concurrent diseases, prevention of a repeated stroke, assistance to processes of spontaneous restoration of the impaired functions, correction of psycho emotional disorder.

At an out-patient stage the efforts of rehabilitation therapists are to higher extent (in comparison with the inpatient stage) aimed at training of a patient in achievement of best possible independence in surrounding life, on identifying his need in auxiliary aids and equipment, assistance to patient and his family in solving of social problems, eventually – on improvement of his life quality and environment.

Much attention is paid to training of the patient's relatives, to control his health, correct nutrition, clothing, transportation, prevention of possible complications, performance in house conditions of some medical procedures (massage, remedial gymnastics).

When organizing social rehabilitation of the disabled people it is necessary to keep to the following basic provisions:

- Provide the disabled person with a possibility to use the ordinary housekeeping equipment and kitchen appliances by his training (retraining) according to his limited physical capacities;
- Equip the available appliances, with some elementary special devices (nozzles, levers, etc.) so that the disabled person could use them;

- Equip the apartment with new special supportive technical means taking into account the needs of the disabled person and to considerably adapt his living conditions to his needs considering the defect type.

Thus, at this stage of rehabilitation the social rehabilitation actions in combination with active physical rehabilitation techniques amid the supporting drug treatment are taking centre stage.

The rehabilitation program at the third sanogenetic level is given below.

### Rehabilitation program No. 3

**Sanogenetic mechanism:** Readaptation (the adaptation to the existing defect).

**Stroke period:** late recovery period, period of stroke consequences.

**Rehabilitation place:** inpatient rehabilitation unit, out-patient rehabilitation unit, rehabilitation at home.

**Rehabilitation purpose:** Resocialization of patients with the purpose of the best possible reaching of before stroke condition - social, labor, in family, society and at work, i.e. rehabilitation in the truest sense of the word.

**Duration:** before running out of the rehabilitation potential.

**The individual program of rehabilitation** (*rehabilitation actions of this period have a pronounced social orientation (rehabilitation as such):*)

1. Correction of the patient's personal reaction to the disease and related social and labor restrictions (individual and group psychotherapy, group discussions, autogenic training).
2. Training of mobility for achievement of maximum autonomy of patients (physiotherapy exercises, massage, walking, exercises at a stand and on a table with a set of articles, work therapy, hydrokinesitherapy, use of wheelchairs).
3. Work on quality of walking manner and increase of fitness (walking, simple and complicated with a support on a floor and without it, exercises in water, elements of games.).
4. Therapy with a creative self-expression (hobby, reading, etc.), work therapy.
5. Increase in balance of a muscular tonus and contractile force of antagonistic muscular groups (physiotherapy exercises, massage and biofeedback therapy).
6. Elimination of speech violations (logopedic treatment).

7. Selection of job, rational employment.

8. Social rehabilitation:

- Social adaptation - achievement of independence in movement (selection and training in use of wheelchairs for the disabled, various auxiliary household appliances and adaptations);
- Social orientation (on opportunity perspectives, need of certain efforts);
- Social education (i.e., training in restoration of the lost self-service skills);
- Social adaptation (adaptation to life conditions);
- Social placement (as final stage of social rehabilitation).

9. Supporting drug treatment: medications improving metabolism in brain tissue, systemic and sedative therapy.

10. Selection of appropriate types of work, profession, rational employment.

Thus, rehabilitation of the stroke patients has to be based on the basic principles of medical rehabilitation (early beginning, succession, continuity, complexity, stage-by-stage approach, individual approach, active participation of patient in rehabilitation process) taking into account the key sanogenetic mechanisms (restitution, compensation, readaptation) and to be guided by a specific rehabilitation program depending on stroke severity; time passed after the stroke; places of rehabilitation; specific features of the patients.

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