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Master's Thesis

THE ROLE OF THE NURSE IN CONDUCTING REHABILITATIVE INTERVENTIONS IN MIDDLE-AGED AND ELDERLY PATIENTS

Master of Science in Nursing

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ABSTRACT

Rehabilitation is an integral part of general health services coverage along with health promotion, prevention of disease, treatment and palliative care.

This research project about the process of rehabilitation and how it helps children, young patients, adults and the elderly to be as autonomous as possible in their daily lives and allows them to get their education, to work and engage in leisure activities, as well as to perform important functions such as caring for their family.

The data for this project were collected via examination of patients (subjective and objective methods): collection of health history and history of present disease, physical examination (inspection, percussion, palpation and auscultation); laboratory and imaging tests, including endoscopic, radiological and ultrasound diagnostics; the statistical method, data analysis, and inferencing.

As a result of this research study, we have reviewed the basic principles of rehabilitative interventions; defined the importance of physical and psychological rehabilitation and studied the mechanisms behind health-promoting effects of rehabilitative interventions; studied the specific features of rehabilitation in elderly patients with musculoskeletal damage; studied the specific features of rehabilitation in cardiovascular disease; defined the basic principles of rehabilitation of patients with certain types of injuries, such as thoracic trauma, abdominal trauma, and patients after surgical interventions on urinary system; and defined the basic principles for rehabilitation of patients with spinal fractures and patients with nervous system diseases.

These findings indicate that people with limited mobility constitute the main part of such patient population; they have more pronounced activity and self-care deficits and as such require physical assistance and prolonged medico-social rehabilitation. Among neurological disorders, the most widely spread entities include cerebrovascular accidents, neurological manifestations of degenerative disc disease and cerebral and spinal injuries.

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INTRODUCTION

The relevance of the study. Rehabilitation is an integral part of general health services coverage [1, 2, 10, 44] along with health promotion, prevention of disease, treatment and palliative care.

Rehabilitation helps children [26], young patients [8, 53], adults [36, 37] and the elderly [2, 6, 22, 28, 29, 40] to be as autonomous as possible in their daily lives and allows them to get their education, to work and engage in leisure activities, as well as to perform important functions such as caring for their family [20].

According to WHO experts [54], approximately 2.4 billion people worldwide currently suffer from disease and conditions where rehabilitation is indicated.

According to experts, due to changes in the health and demographics of the population, the worldwide need for rehabilitation will continue to increase. Thus, increasing life expectancy is associated with an increase in the burden of chronic disease [4, 17, 32, 49, 54] and disability.

Currently, the demand for rehabilitation services remains largely unmet [2, 10, 44]. In some low- to middle-income countries, more than 50% of people do not have access to the rehabilitation services they need. In addition to that, the rehabilitation services are among the healthcare services most affected by the COVID-19 pandemic.

Rehabilitation is defined by the specialists in this medical field as “a set of measures aimed at restoring a person’s functional capabilities and reducing the level of disability in people with health disorders, taking into account their living conditions” [54].

In other words, rehabilitation is aimed at helping people of different age categories [26, 40, 53] to be as independent as possible, and to perform all of their necessary social functions. To this end, the framework of rehabilitation involves the treatment of comorbid conditions such as pain, assistance with

restoration of functions needed in daily life, and support in coping with the challenges associated with cognitive impairment, visual and hearing impairments, as well as difficulties with communication, eating or mobility [54].

At some stage in life, rehabilitation services may become necessary for any individual as a result of injury [9, 22, 41, 43], surgical intervention [9, 13], cardiovascular disease [3, 4, 12, 15, 46, 51], respiratory system disease [14, 21, 34, 48], musculoskeletal disease [25, 29] (including bone fractures [7, 33, 36, 37, 40]), reproductive system disorders [31], nervous system disease [19, 24, 27, 35, 44, 47, 52] (including rehabilitation after stroke [18, 20, 30, 31, 45] and head injuries [41]), cancer [39], rheumatic disorders [38] or other health problems, including problems with mental health [8, 53], as well as due to age-related decline in functionality [6, 22, 29].

An important position within rehabilitation of patients with various diseases belongs to nurses [5, 12, 28, 30, 42, 48, 49], who are required to have deep theoretical knowledge on the basics of rehabilitation [1, 10, 44], to possess all necessary practical skills, including those of psychotherapeutic deontology, and to have high moral standards.

The achievements of modern science and technology [12, 24, 52], and the availability of more effective physiotherapeutic methods [15, 17, 32, 33, 42] in clinical practice requires a modern nurse [11, 27, 29, 31, 47, 50] to have more thorough knowledge of modalities and capabilities of physical methods in prevention, treatment and medical rehabilitation. Other expected strengths include teamwork skills [50] of rehabilitation care in a hospital [23] and home [20] setting using various rehabilitation programs [19], including electronic systems [12], virtual programs [24], and programs involving robots and other high-tech devices [52].

The aim of the study: the research into the basic principles and methods of patient rehabilitation at different stages; a study of the role of physical factors within the framework of therapeutic, prophylactic and rehabilitative interventions.

Study objectives.

1. To study the basic principles of rehabilitative interventions.
2. To determine the importance of physical and psychological rehabilitation and to study the mechanisms of health-improving effects of rehabilitative interventions.
3. To study the specific features of rehabilitation in elderly patients with musculoskeletal damage.
4. To study the specific features of rehabilitation in cardiovascular disease.
5. To define the basic principles of rehabilitation of patients with certain types of injuries, such as thoracic trauma, abdominal trauma, and patients after surgical interventions on urinary system.
6. To define the basic principles of rehabilitation of patients with spinal fractures and patients with nervous system diseases.

The object of research. Patients with injuries of the musculoskeletal system, cardiovascular disease, certain types of injuries (thoracic trauma, abdominal trauma), patients after surgical interventions on urinary system, patients with spinal fractures, and middle-aged and elderly patients with diseases of the nervous system, who need rehabilitation.

The subject of research.Organization of rehabilitation care in middle-aged and elderly patients depending on the type of injury or disease.

The methods of study: examination of patients (subjective and objective methods): collection of health history and history of present disease, physical examination (inspection, percussion, palpation and auscultation); laboratory and imaging tests, including endoscopic, radiological and ultrasound diagnostics; the statistical method, data analysis, and inferencing.

The scientific and practical value of the study. As a result of this research study, we have reviewed the basic principles of rehabilitative interventions; defined the importance of physical and psychological rehabilitation and studied the mechanisms behind health-promoting effects of

rehabilitative interventions; studied the specific features of rehabilitation in elderly patients with musculoskeletal damage; studied the specific features of rehabilitation in cardiovascular disease; defined the basic principles of rehabilitation of patients with certain types of injuries, such as thoracic trauma, abdominal trauma, and patients after surgical interventions on urinary system; and defined the basic principles for rehabilitation of patients with spinal fractures and patients with nervous system diseases.

CHAPTER 1
THE BASIC PRINCIPLES OF REHABILITATIVE INTERVENTIONS (REVIEW OF LITERATURE)

The WHO experts argue that presently various disease an conditions where rehabilitation is indicated affect approximately 2.4 billion people on a global scale [54]. Taking the forecasts of experts into account, and due to changes of demographic trends in the populations of different continents and countries, the need for rehabilitation will continue to grow globally.

Life expectancy continues to increase; by 2050, the global population over the age of 60 is projected to double, and more people are predicted to suffer from chronic diseases such as diabetes, stroke [18, 20, 30, 31, 45], cancer [39], and cardiovascular [3, 4, 12, 15, 46, 51], respiratory [14, 21, 34, 48], musculoskeletal [25, 29], reproductive [31] and nervous system disease [19, 24, 27, 35, 44, 47, 52]. At the same time, injury rates and the prevalence of developmental disorders in children (such as cerebral palsy) remain quite high. These abnormal conditions may negatively affect the functional capacity of an individual and contribute to an increase in disability with the resulting need for rehabilitation [1, 2, 10, 44].

In many regions of the world, these increasing rehabilitation needs are largely unmet. In some low- to middle-income countries, more than a half of people where rehabilitation services are indicated do not receive such services [54]. The rehabilitation services are presently among the healthcare services most affected by the COVID-19 pandemic.

On a global scale, the rehabilitation needs remain unmet due to a number of factors:

- low priority level given to rehabilitation, lack of sufficient funding, lack of nation-wide policies or plans regarding provision of rehabilitation services;

- lack of access to rehabilitation services beyond urban areas and long waiting periods;
- high level of spending by the population on rehabilitation services [1, 10] and lack or inadequacy of financial support mechanisms;
- deficiency of skilled rehabilitation specialists [11, 27, 30]: in many low- to middle-income countries, the number of qualified personnel is less than 10 per 1 million people;
- insufficient resources, including assistive technologies [24, 52], equipment and supplies;
- low level of research work and collection of rehabilitation data;
- ineffective or underutilized mechanisms for referral of patients [19, 20] to rehabilitation services.

Natural disasters, such as earthquakes and disease outbreaks, and man-made disasters, including armed conflicts, terrorism or industrial accidents, can create an enormous need for rehabilitation services related to injury [9, 22, 43] or disease [35, 47, 52]. At the same time, all these catastrophes and disasters disrupt the ongoing service provision and have the most negative impact on the most vulnerable populations and the weakest health systems.

In spite of the fact that clinical and humanitarian guidelines acknowledge the important role of rehabilitation in emergency settings, this role is seldom taken into account in the context of ensuring preparedness and rapid response of health systems in emergencies. This aggravates the already existing problems with provision of rehabilitation services [10, 44], reduces the efficacy of health services, and victims of emergencies are subject to increased risk of disease and disability.

The activities of the WHO are largely aimed at eliminating these difficulties in the organization and provision of rehabilitation services [54].

In order to unleash the full potential of rehabilitation services, action needs to be taken to strengthen health systems overall and include rehabilitation

as part of health services for the population at all levels of the health system, by making rehabilitation one of components of universal health coverage.

In 2017, the WHO launched an initiative to provide rehabilitation services by 2030 [54], emphasizing the need to strengthen health systems and calling on all stakeholders around the world to join forces in various priority areas, including improved leadership and management; formation of numerous and diversified labor resources in the field of rehabilitation; increasing the level of funding for rehabilitation services; and improving data collection and research on rehabilitation.

The WHO is also taking measures to identify problems [54] and supports the strengthening of health systems in order to ensure the availability of rehabilitation services by:

- providing technical support and capacity building at the country level;
- generating political support, prioritizing rehabilitation and resource mobilization;
- developing norms, standards and technical guidelines;
- setting the research agenda and progress monitoring.

Some examples of rehabilitation services include:

- exercise for correction of speech, language or communication deficits after head injuries [41];
- modification of living conditions of older people [2, 6, 22, 40] in order to improve their safety and autonomy while at home and reduce the risk of falls and injuries [9, 22, 43];
- health education for people with cardiovascular disease [3, 4, 12, 15, 46];
- making and fitting prostheses for people who have had a leg amputation and training them how to use such prostheses;
- immobilization and splinting to promote skin healing, to reduce swelling and to restore motor function in people undergoing surgery for burns;

- prescribing drugs to reduce muscle stiffness in children with cerebral palsy or in patients after a stroke [18, 30, 31, 47];
- providing psychological support to people suffering from depression and other mental disorders [8, 53];
- providing rehabilitation services to athletes after injuries [43];
- teaching blind people to use a white cane.

Rehabilitation services are greatly individual; this means that the selection of interventions and approaches should be made taking into account the goals and preferences of the patient, as well as the patient's age [26, 28, 40, 53] and disease specifics [9, 20, 34]. Rehabilitation services may be provided both in healthcare facilities (at the premises of public or private hospitals and outpatient clinics) [23] and in local communities, e.g. in the home [20].

Provision of rehabilitation services involves a number of professionals, such as physical therapists, speech therapists, orthotists and prosthetic technicians, clinical psychologists, rehabilitation physicians and nurses [5, 27, 29, 48, 50].

Rehabilitation has immense significance for the patient, for their family and for the society as a whole.

Rehabilitation may help alleviate the adverse sequelae of a wide range of abnormal conditions [3, 4, 21, 49], including acute and chronic disease and injuries [22, 43]. Rehabilitation services may also be provided in addition to other interventions, including medical procedures and surgical interventions, thereby contributing to the achievement of optimal treatment outcomes. Thus, through the provision of rehabilitation services, the complications of many conditions, such as spinal cord injury [41], stroke [24, 27, 35] or fracture [7, 36, 37], can be alleviated, mitigated or prevented.

Rehabilitation helps to minimize or slow down the development of the disabling sequelae of a number of chronic diseases, such as cardiovascular disease [4, 15, 46], cancer [39] and lung disease [12, 21] by providing patients

with self-help techniques and/or applicable assistive devices or by treating pain or other complications.

The expenditures on rehabilitation services should be viewed as an investment that brings returns both at the individual level and at the level of society as a whole. Owing to rehabilitation, costly hospitalization can be avoided [23], the patient's hospital stay can be reduced, and the need for repeated hospitalization can be prevented. In addition to that, rehabilitation provides people with an opportunity to proceed with their education, to engage in paid work, to be autonomous in their daily life and require minimal external financial support or physical assistance [19, 20].

Rehabilitation is an important constituent of universal health coverage and presents one of the key strategies for achieving Sustainable Development Goal 3 (“Ensure healthy lives and promote well-being for all at all ages”).

Nonetheless, there are some common misconceptions concerning rehabilitation. Some people think that rehabilitation is needed only by people with long-term health problems or disability. On the contrary, rehabilitation is one of the staple health care services [1, 2, 10, 44, 54], intended for all individuals suffering from acute or chronic diseases, disorders or injuries, which limit their functionality, which is why rehabilitation services should be available to everyone who needs them.

Rehabilitation does not have to be an exclusive type of medical care available only to those who are able to pay for it. Neither should it be viewed as an optional service, which can only be used when other treatments and prevention measures have failed.

In order to fulfill all the social, economic and medical benefits of rehabilitation in full, the entire population should have access to timely, high quality and affordably priced rehabilitative interventions. In many cases, this implies the need to begin rehabilitative interventions immediately after detection of an abnormal condition and continuous use of the rehabilitative interventions alongside with other medical care interventions.

Nurses should know the basic principles and methods of patient rehabilitation at different stages [11, 27, 29, 31] and use them in their work, as well as understand the role of physical factors [15, 17, 32, 33] and physiotherapeutic methods within the framework of therapeutic, prophylactic and rehabilitative interventions. Knowledge about the principles of health resort and outpatient follow-up stages of rehabilitation is very useful, since it plays an important role in restoring professional and labor activities of the patient.

Given the above specific aspects, an important position within rehabilitation belongs to nurses [5, 12, 28, 30], who are required to have deep theoretical knowledge on the basics of rehabilitation, to possess all necessary practical skills, including those of psychotherapeutic deontology, and to have high moral standards.

CHAPTER 2
THE OBJECT OF RESEARCH AND METHODS OF STUDY

The object of our research included patients with injuries of the musculoskeletal system, cardiovascular disease, certain types of injuries (thoracic trauma, abdominal trauma), patients after surgical interventions on urinary system, patients with spinal fractures, and middle-aged and elderly patients with diseases of the nervous system, who need rehabilitation.

This research study involved 4 series (see Table 2.1)

Table 2.1. Design of research study

Series of research study	The profile of injuries or disease in the patients that require rehabilitation	Number of patients	Age group
Series I	patients with musculoskeletal trauma: hip fractures; ankle fracture; fractures in the arms and legs; fracture of the humerus	149	Middle-aged and elderly
Series II	Patients with cardiovascular disease	134	Middle-aged and elderly
Series III	Patients with thoracic trauma, abdominal trauma, and patients after surgical interventions on urinary system	97	Middle-aged and elderly
Series IV	Patients with spinal fracture or diseases of the nervous system	43	Middle-aged and elderly

Our research study has used the following methods of assessment of patients with injuries and diseases of organs and systems (subjective and objective methods): collection of health history and history of present disease, physical examination (inspection, percussion, palpation and auscultation); laboratory and imaging tests, including endoscopic, radiological and ultrasound diagnostics; the statistical data analysis, generalization of study results and inferencing.

CHAPTER 3
THE IMPORTANCE OF PHYSICAL AND PSYCHOLOGICAL REHABILITATION AND THE MECHANISMS OF HEALTH-IMPROVING EFFECTS

Medical rehabilitation is an initial link in the system of general rehabilitation, because the first thing a sick person needs is medical aid.

The term “rehabilitation” originates from the Latin word “habilis” meaning “ability”, and a prefix “re-” meaning “again”, hence “restoration of ability”.

Rehabilitation is a set of coordinated measures of a medical, physical, psychological, pedagogical and social nature aimed at complete restoration of health, mental status and working capacity of persons who have lost these abilities as a result of disease.

Based on the diversity of rehabilitation tasks, it is conditionally divided into the so-called types or aspects of rehabilitation: medical, physical, psychological, socio-economic and professional.

The medical aspect of rehabilitation is a set of therapeutic interventions aimed at restoration and development of physiological functions of the patient, at detection of their compensation abilities in order to provide conditions for their future return to an active autonomous life. This aspect of rehabilitation is associated with therapeutic interventions throughout the entire period of patient observation and includes the issues of early hospitalization, prescribing medications, and later, after the patient returns to work, the organization of active outpatient follow-up and systematic preventive treatment, including secondary prevention interventions.

The physical aspect of rehabilitation is aimed at restoring the physical performance of the patients, which is ensured by timely and adequate activation of patients, early use of exercise therapy, and, in a later period, physical training.

The psychological dimension of rehabilitation. Evaluating the nature and the severity of mental disorders that often develop in various disease, and timely therapeutic response to these disorders is one of the objectives of this dimension of rehabilitation.

The occupational dimension of rehabilitation. The issues of employment, vocational training and retraining, and determination of working capacity of patients are the subject of the professional dimension of rehabilitation.

The socio-economic dimension of rehabilitation includes the issues of interaction between the patient and the society, the family, and the pension system.

In fact, there is no clear delineation between the period of treatment of a sick individual and the period of their rehabilitation. Medical rehabilitation begins in the hospital virtually simultaneously with the cessation of acute manifestations of the disease. It is then that the time comes for the aftercare of the disease and restorative interventions, where all types of necessary treatment are used, including surgical, therapeutic and orthopedic modalities.

Special restorative treatment is carried out in the rehabilitation department (restorative treatment) in the same hospital or in a specialized hospital/rehabilitation center, or, if there is no need to keep the patient in a hospital, in an outpatient rehabilitation unit or in a rehabilitation center. Admission to restorative treatment departments and intermittent treatment at health resorts or spas (where physical therapy, work therapy, exercise therapy, etc. are widely used) is what medical rehabilitation actually is.

Of primary importance for rehabilitation physical therapy are physical factors, which increase the body's resistance to negative external and internal effects, and enhance protective and adaptive mechanisms.

Work therapy is an effective method in some diseases. It works as a natural stimulant, restores overall activity, reduces anxiety and facilitates relationships.

Exercise therapy stimulates the activity of all body functions and contributes to an increase in overall productivity.

Rehabilitation is a multifaceted process of restoring human health. Alongside with medical rehabilitation and alongside with it, other forms of rehabilitation are used, including psychological, pedagogical, socio-economic, occupational rehabilitation and daily living rehabilitation.

Physical rehabilitation is an integral part of medical rehabilitation and socio-occupational rehabilitation, which uses the tools and methods of exercise therapy, massage therapy and the effects of physical factors.

Psychological rehabilitation is understood as a therapeutic influence of a nurse/doctor on an ill or disabled person in order to help them manage the feeling of hopelessness in their mind and the idea of the futility of treatment, and inspire confidence in a successful outcome of treatment, especially if there are objective improvements. This type of rehabilitation accompanies the entire cycle of restorative treatment.

Physical rehabilitation is paramount in the regeneration process. It should be viewed as a medico-pedagogical and educational process. The main means of physical rehabilitation are physical exercises and elements of sporting activities. They produce positive effects when they are adequate to the capabilities of the patient or person with disability. A physical activity that is repeated multiple times and systematically gradually causes functional and even structural positive changes in the human body.

Physical challenge may be gradually increased as a result of training. This improves motor skills, develops and hones strength, endurance, speed, flexibility and agility. No other means and methods of rehabilitation can replace physical exercise. As a result of training, there is an improvement in the regulatory mechanisms of adjustment to the dynamically changing environment, and new motor skills are formed and strengthened. The skeletal muscles, which are more than 400 in number, constitute an active part of human locomotion apparatus.

Daily walks in the outdoors produce beneficial effects. By making just one step, the human sets in motion approximately 300 muscles (108 muscles in the lower extremities and 144 muscles in the vertebral column; 20 muscles keep the head balanced, and some muscles of the upper extremities are also used). Physical inactivity is the scourge of consumerist society. Being physically active, having a correct posture, developing a muscle core and a generally healthy lifestyle allow the person to stay young longer.

A healthy lifestyle implies a mandatory minimum of physical activity. Only those who exercise regularly may count on a positive effect. The patient should take into account their actual capabilities and limitations, their health status, level of fitness and their doctor's recommendations. No matter how advanced the health system is, it cannot safeguard a person from all diseases. A person is the master of their own health.

Patients with disability should be as physically active as possible, improve their endurance against environmental challenges, engage in physical training and sports, adhere to the rules of personal hygiene, and take reasonable efforts to ensure a harmonious health. By engaging in a customized muscle-building exercise program where indicated, individuals may develop good physique and vigor.

For example, strength exercises with dumbbells were contraindicated in people with disabilities and in the elderly 15-20 years ago. However, today their use is considered possible and beneficial, provided proper dosing of physical challenge is in place. Physical exercise improves the adaptation of the body to the real conditions of life. As a result of health-improving training, the functional capabilities of the cardiovascular system are improved. In active muscular activity, there is an optimization of cardiac function at rest and an increase in the cardiovascular reserves.

As fitness increases and myocardial oxygen demands reduce, the level of threshold overload (which a person can withstand without the threat of myocardial ischemia and angina attack) becomes higher. A decrease in the tone

of the sympathetic nervous system becomes evident. As a result, the body becomes more stress-resistant. Under the influence of training, there is a higher level of general endurance and physical performance, which are direct indicators of “biological age” and viability. There are reductions in risk factors of cardiovascular disease, i.e. reductions in body weight and fat, serum cholesterol and triglycerides, blood pressure and heart rate.

In addition to that, regular physical training may considerably slow down the development of age-related changes in physiological functions, as well as degenerative changes of various organs and systems (including delay and involution of atherosclerosis). Performing physical exercise has a positive effect on all components of the locomotor apparatus and prevents the degenerative changes associated with age and hypodynamia. There is increased mineralization of bone tissue and the calcium content in the body, which prevents the development of osteoporosis. More lymph is flowing to articular cartilages and intervertebral disks, which is the best way to prevent arthritis and degenerative disc disease. Many diseases are difficult to overcome, but that is still possible.

Regular physical training may considerably decelerate development of age-associated changes in physiological functions, as well as degenerative changes in various organs and systems (including delay and involution of atherosclerosis). Performing physical exercise has a positive effect on all components of the locomotor apparatus and prevents the degenerative changes associated with age and hypodynamia.

The main objective of medical rehabilitation is the full restoration of the functional capabilities of various body systems, including the musculoskeletal system, as well as the development of adaptions to daily life and work. Recuperation of a patient after a disease and rehabilitation of the patient are far from being synonymous, because in addition to restoring health, it is necessary to restore their ability to work (performance in the workplace) and social status, that is, to help the individual to return to their full-fledged life in the family, in the society and in the workplace.

The knowledge on the importance of physical and psychological rehabilitation and the mechanisms of health-improving effects that we have received, we used in the subsequent series of the research study to form an individual approach rehabilitative interventions in patients with various diseases.

CHAPTER 4
THE SPECIFIC FEATURES OF REHABILITATION IN ELDERLY PATIENTS WITH MUSCULOSKELETAL DAMAGE

In order to assess the special aspects of patient rehabilitation in musculoskeletal damage, in this series of the research work, we have assessed 149 patients with various musculoskeletal damage who were in need of rehabilitative interventions.

Bone fractures in the elderly are the injuries occurring as a result of age-related thinning of bone and cartilaginous tissue, and insufficient amount of calcium. Recuperation after traumatic injuries in elderly people usually takes a long time. In addition to that, such patients require a special and thorough care, which often cannot be provided in their homes. In most cases, it is advisable to contact a rehabilitation center, where experienced professionals will take all the care of the sick person and provide them with competent treatment, rehabilitation and care. We have studied 149 patients with musculoskeletal injuries.

With age, metabolism deteriorates, and bone tissue begins to wear out. This is why older people need a correct and balanced diet and a thorough, patient-oriented care. One of the factors that triggers injuries is ambulation without supervision and support, when even seemingly insignificant falls may result in serious complications.

The consequences of fractures can be very different; repeated traumatic injuries may occur, or more serious complications may develop.

Concerning the incidence of injuries, older people occupy a leading position. Age-related wear and thinning of bone tissue, lack of vitamins and minerals: all of these factors lead to bone injury. Of all documented cases of bone fractures, approximately 70% occur in elderly people.

The following types of fractures are more frequently documented in the elderly:

- hip fractures;
- ankle fractures;
- upper and lower limb fractures;
- humerus fractures.

Our study enrolled 32 patients with hip fractures; 46 patients with ankle fractures; 48 patients with upper and lower limb fractures; and 23 patients with humerus fractures.

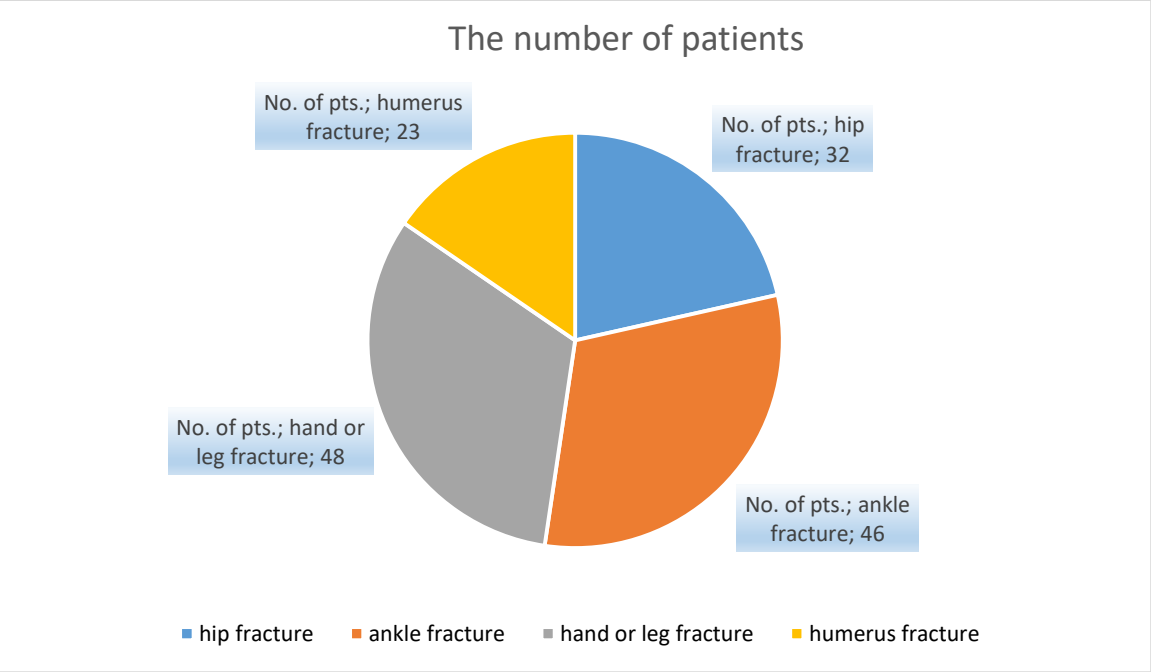


Figure 4.1. The number of patients with various types of musculoskeletal damage who took part in the study

Older people may sustain an injury literally on level ground, which is why it is important to support them during walks and to create safe environment in the home, especially in the bathroom.

Diet in elderly people with fractures is of a greatest importance. The speed of recovery depends on whether the patient is on a proper diet, since their body receives all the necessary minerals and vitamins with food. The dietary plan

should be developed for each individual patient by a nutritionist, and the nurse should monitor the implementation of the nutritionist's recommendations.

Elderly people with fractures should do the following:

- consume calcium-containing foods every day;
- take additional vitamin and mineral supplements;
- eat lean foods;
- it is recommended to steam meat products and give preference to beef and chicken;
- boiled fish should be introduced into the daily menu;
- nuts, berries and fruits should be a mandatory part of the diet.

Prevention of fractures includes not only proper diet, but also special therapeutic procedures aimed at strengthening bone and cartilage tissue. Without appropriate knowledge, skills and experience, it is impossible to cope with this task on one’s own. At the stage of rehabilitation, the patient should adhere to all recommendations by their health professional, whose duties include taking care not only of nutrition of the elderly people, but also the implementation of the therapeutic and preventive procedures prescribed by the physician.

The restorative program is not only about proper balanced nutrition and physical exercise. This is an action plan aimed at maintaining quality life, restoring psychoemotional background and helping an elderly patient recover from a depressive state.

At the stage of rehabilitation, the patient should receive the following services, which will contribute to their speedy recovery and acquisition of the necessary skills, as well as create comfortable conditions:

- psychological support;
- using wheelchairs and functional beds;
- personalized diet plan designed by a nutritionist;
- temporary or round-the-clock caregivers;
- health status monitoring;
- visits by doctors of different profiles;

- development of a customized rehabilitation program.

We have studied a set of rehabilitative interventions in hip fracture and its use in rehabilitation of this patient population.

Hip fracture is a dangerous trauma situation, which most frequently occurs at the age of 55 years. The femoral neck has a narrow shape. This is why it is prone to various injuries. Sometimes one awkward movement is enough to damage it.

In middle-aged patients, rehabilitation after a hip fracture usually takes 3-6 months. This time depends on the complexity of the fracture, on the physiological features of the victim, on the status of their immune system and on the presence of aggravating factors. In patients who have crossed the 65- or 80-year milestone, fracture healing (with persistent and systematic exercises) takes a longer time, 6-8 months, sometimes more than 12 months. In patients up to 65 years of age, osteosynthesis is more often performed; in patients older than 65 years, joint replacement is recommended. The treatment of skeletal injury in the elderly often occurs with the use of external therapy (i.e. without surgery). This approach is employed if the injury has such comorbidities as hypertension, diabetes, heart attack, irreversible mental disorders, etc. Sometimes older patients have to remain bedridden for the rest of their lives.

Surgery-free rehabilitation after a hip fracture without surgery.

The rehabilitation program after hip fracture without surgery involves the following stages:

1. From the first day of patient’s hospitalization, a prescribed program of physical and breathing exercises should be performed. Initially, all patient education classes are occurring under the supervision of health care personnel.
2. The program of exercise therapy is gradually becoming more complex and long-term. The patient needs to make more effort and to involve as many muscle groups as possible. At this stage, patients are allowed to get up in the bed.

3. Since the 3rd day of hospitalization, patients have therapeutic massage. The massage therapy begins from the lower back, then on a healthy leg and lastly on the injured limb.
4. Electrical therapy and heat treatments are started in a week's time.
5. In two weeks, the patient should begin active movements with their injured lower limb. The treatment is started with the knee joint; subsequently, the hip joint is treated.
6. In 3 months, the patient is advised to start getting out of bed and attempt walking with support, avoiding loading the injured leg. To this end, walkers, crutches and canes are used.
7. Six months after hospitalization, the patient may be allowed to lean on the injured limb.

However, the above terms of healing are conditional. The treating physician develops an individual rehabilitation scheme for each particular case of the disease.

Postoperative rehabilitation after a hip fracture.

Early adjustment period. The physician designs a customized therapeutic package, which takes into consideration the severity of the disorders, the age, and the general health of the patient. The implementation of the package begins the moment the victim recovers from anesthesia and regains sensitivity in the foot.

From the first minutes, the patient may:

- wiggle their toes
- bend and unbend their toes
- press with the heels against the mattress without moving the feet
- strain the muscles of the healthy leg without moving it in the joints.

In 3 hours, the patient may smoothly and slowly turn and rock their soles. In this case, there should be no pain or discomfort. Starting from Day 2, restorative therapy should be enhanced with simple exercise. While exercising, the patient should avoid pain and be attentive to what they are feeling.

The following activities are allowed:

- imitate walking with the patient's feet, raising the shoulders and swinging the arms
- bend their knees little by little, sliding their feet along the sheet
- bend the healthy limb in the knee, lean on the heel, tilt the limb left and right; alternate the exercise with short pauses in between
- slightly raise straightened left and right lower limbs alternately (at an angle of not more than 10-15 degrees), trying to hold the lower limb in this position for 2-3 seconds.

The patient can make alternating contractions of the muscles of the abdomen and back, lasting 20-30 seconds each. Useful exercises include shaking and rotating hands, making "boxing-type" movements and squeezing the grip strengthener. All these exercises will help restore and maintain circulation. For strengthening the muscles of the head and neck, side turns and tilts will be optimal. On Day 3, the exercises for healing of the extremity are supplemented with massage therapy. Stroking, grasping and spiral rubbing are performed. The aim of the procedure is to relieve pain, activate trophic processes, and stimulate blood and lymph supply to the cells of the injured extremity. In healthcare institutions, the therapeutic schedules include electric therapy, such as ultrasound therapy and magnet therapy. On Day 4, the patient may slowly flex the operated extremity the operated limb in the hip joint. Useful techniques include isometric straining of the affected lower limb, i.e. alternating 1.5-2 second straining and relaxing of muscles in the feet, legs, thighs and buttocks. On Day 5, the patient may stand up supported by crutches. At first, the patient should stand upright for a while and get used to the vertical position. Press the affected limb to the healthy limb and then pull it aside. Ask the patient to perform smooth back and forth movements with their lower limb. Beginning with Day 2-3 of standing from the bed, the patient should make steps using crutches, while avoiding leaning on the affected extremity. On Day 7, the patient should start walking in 10-minute intervals twice a day, gradually switching to

walking in 15-minute intervals three times a day. The patient should try to sit down without the help of another person. The patient should carefully turn to their belly and lie in a prone position for several minutes. Within 10-14 days, the range of exercise should be gradually extended:

- while on their back, the patient shall bring their straight legs together, sliding them along the sheet
- while on their back, the patient shall raise their legs outstretched
- bending a healthy limb at the knee and leaning on the heel, the patient shall raise the pelvis and hold it
- leaning on their hands, the patient shall stretch their legs and try to raise their torso
- having assumed a sitting position, the patient shall let their legs hang down from the bed, straighten them at the knees, and "freeze" for a few seconds.

This is the right time to learn how to use crutches to walk up the stairs. When the patient goes up, the sequence is good leg – injured leg – crutch. When the patient goes down, the sequence is crutches – bad leg – good leg. The adage to help patient remember the right sequence is “up with the good one, down with the bad one”.

Late adjustment period

In 3 weeks the patient is discharged from the hospital; further adjustment occurs in the home (or in a medical center/health resort as applicable). It is recommended to make the apartment/house “patient-friendly” and to use railings, walkers, crutches and canes when moving around. Rubber mats should be placed on the floor in the kitchen and bathroom.

Physical therapy and electric therapy procedures in the elderly should be aimed at the following:

- elimination of edema
- restoring circulation in surgery site
- accelerating wound healing

- preventing penetration of infection

The patients shall follow the exercise program developed by the exercise therapist/physical therapist. Manual massage helps prevent muscle atrophy. The patient may begin leaning on the operated leg intermittently only starting from Month 3-4, and not fully, only approximately 1/3 of the body weight. The patient may begin standing normally only from Month 6.

The exercise program after ankle fracture in middle-aged and elderly people.

Ankle fracture is a relatively common type of fracture, especially in elderly people. The typical mechanism in ankle fractures is a foot twist, which may occur when a person trips and falls. This type of fracture may also result from a direct injury (e.g., in a motor vehicle accident) or fall from height. Depending on the severity and site of the fracture, treatment approaches may include a plaster cast, orthotics or surgery.

Forced immobilization while the ankle joint remains in a cast causes a significant weakening of the musculoskeletal apparatus, and deterioration of circulation and tissue nutrition. In order to accelerate functional recovery, and to invigorate the delivery of nutrients to the injured area (which are required to accelerate osteointegration), the patient should start exercising their injured leg while it’s still in the cast. To this end, physiatrists and other rehabilitation professionals have developed effective exercise programs for use in patients with ankle fractures.

Exercise therapy in ankle fractures before plaster cast removal.

On Day 2-3 post-immobilization, it is recommended to exercise only the muscles that are adjacent to the site of injury.

The exercises in a seated position are performed for both legs alternately; it is recommended to repeat them every 2 hours:

1. Tension and relaxation of the gastrocnemius, gluteal and femoral muscles, 10-20 times;

2. Squeezing and unclenching fingers for 1 min;

During this period, the post-fracture ankle exercises exclude the possibility to step on the injured leg.

The following exercises are to be performed 10-15 times when seated:

3. The feet are on the floor; unbend the knee of the injured leg and stretch it parallel to the floor; after this, return to the original stance;

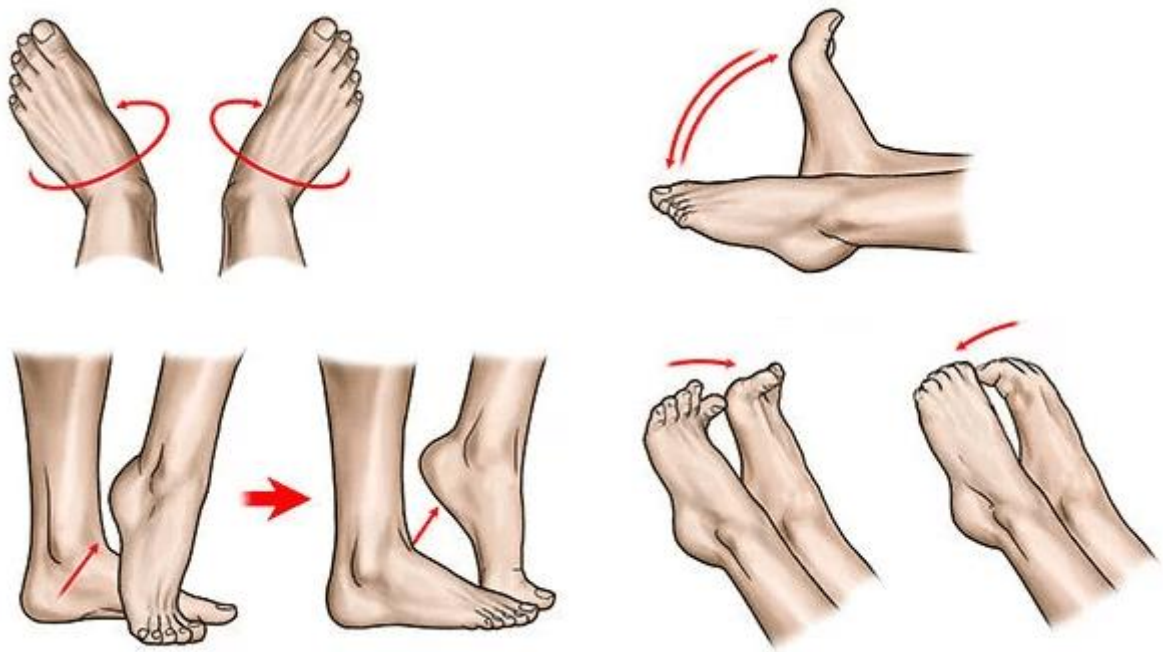
4. Lift up the knee of the flexed lower limb as much as possible.

The following exercises are to be performed when standing on the floor and leaning on the back of a chair:

1. Abducting the leg aside with a several seconds' retention;

2. Abducting the leg behind;

3. Smooth front swings.



Exercise therapy after plaster cast removal

Initially, it is recommended to exercise every other day, and then proceed to daily training, increasing the time and expanding the range of motion.

The exercise after ankle fracture to be performed when seated and repeating each movement for 2-3 minutes:

1. Initially, the feet are on the floor. Without lifting the heels, lift the toes up (at first, with both feet simultaneously, then alternating the feet);

2. Leaning on the toes, raise and lower the heels;

3. Rolling from heels to toes;

4. Lifting the toes up with a simultaneous sideward turn;

5. The toes stand side by side; then the heels lift up and spread apart;

6. The toes are leaning against the floor; at the same time, the heels are making rotational movements clockwise and then counterclockwise.

7. Opposite exercise is to be done with toes;

8. The legs are straightened at the knees, the feet rotate in different directions, the fingers are squeezed and unclenched.

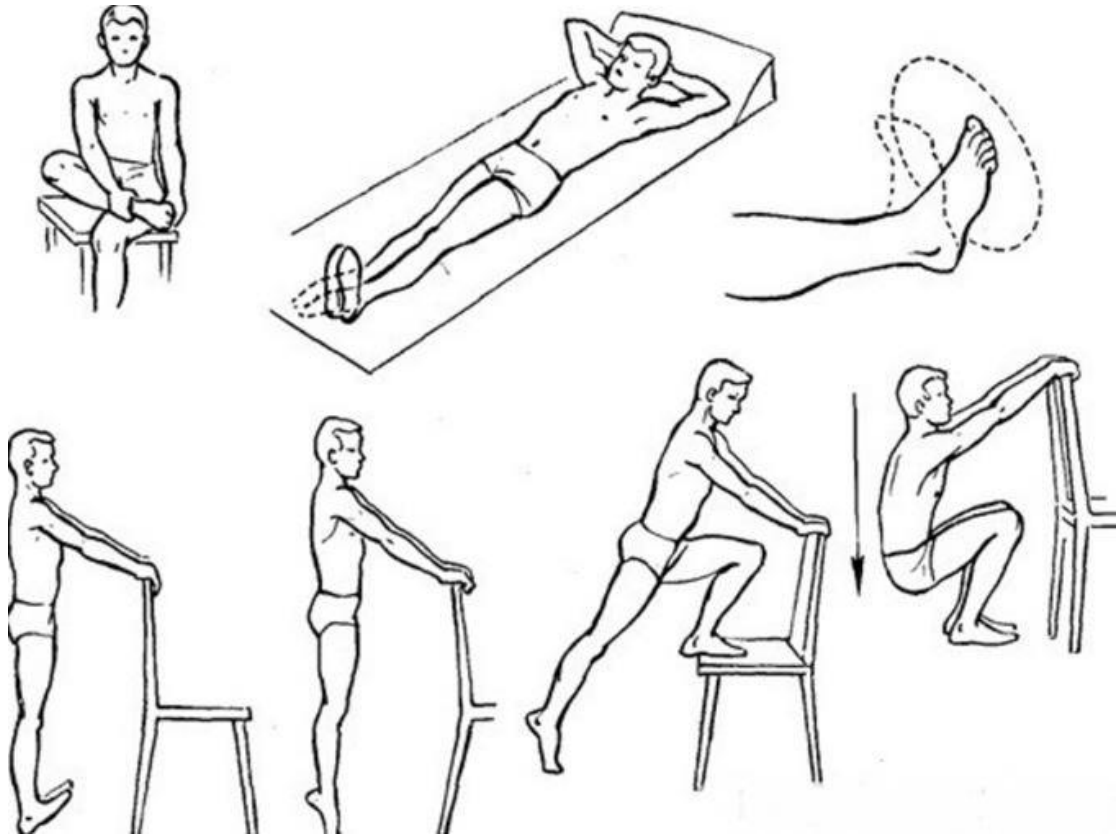
As rehabilitation after ankle fracture progresses, the same exercises may be performed already in an upright position and new movements may be added as follows:

1. Walking on toes and heels, as well as walking on the inner and outer side of the feet;

2. Rolling a rolling pin;

3. Ask the patient to stand barefoot on the edge of a spread thin fabric, and to use their toes to grab the fabric under their feet.

To prevent foot swelling, as the patient to keep their feet elevated when resting.



The above rehabilitative interventions have been used for rehabilitation of the patients who took part in our study, namely: 32 patients with hip fractures; 46 patients with ankle fractures; 48 patients with upper and lower limb fractures; and 23 patients with humerus fractures. All patients have reported substantial improvements in their condition.

Rehabilitation after joint replacement.

Joint replacement is the most effective method to solve problems with joints caused by such disease as degenerative joint disease. A surgery is used to replace a knee joint or a hip joint. This is followed by a prolonged period of rehabilitation.

Older people have problems tolerating any surgical interventions, and after joint replacement they may become virtually immobile. For a time, their physical activity should be limited, and subsequently restored with the help of specialist personnel.

On the average, functional restoration of an elderly person after a joint replacement procedure takes 3 months and more, and consists of several stages,

each of which includes exercise therapy and physical therapy procedures. By gradually increasing physical challenge, the specialists help improve the function of the extremity quite rapidly, and avoid complications at the same time. Timely elimination of pain and edema is equally important.

I. Knee replacement procedure – postoperative rehabilitation protocol.

Phase 1: early functions (Week 1)

Day of surgery

- continuous passive movements within 0-60°, which are started in the postoperative recovery room during no less than 4 hours
- ice packs for 20 minutes every 1-2 hours

During the periods when passive movements are not performed, a rolled-up towel is put under the heel as a bolster.

First day after surgery

- the range of continuous passive movements is increased by 10 degrees. This should be performed daily until the patient can flex their knee up to 90 degrees.
- place ice packs on the operated knee for 15 minutes at least 3 times a day
- performing in-bed exercises for the gluteal muscles and quadriceps muscle of thigh, and sliding motions with the heel
- ask the patient to sit up at the edge of the bed without the help of another person
- assisted walking using crutches or a walker

Second day after surgery

- continue the above described procedures
- performing in-bed exercises independently 5 times a day
- sitting on a chair for 30 minutes twice a day
- active movements at the knee in the range of 0-75 degrees

Third day after surgery

- continue the above described procedures

- achieving mobility in the bed
- walking with standard crutches
- negotiating 3-4 steps
- the start of flexion in the knee joint and in the hip joint in a standing position
- sitting on a chair and taking food
- active movements at the knee in the range of 0-85 degrees

The fourth and the fifth day after surgery

- continue the above described procedures
- independent mobility in the bed and locomotion
- negotiating 4-8 steps
- active range of motion in the joint of 90 degrees

Phase 2: functional enhancement (2-5 weeks)

- walking with a cane
- improved straightening of the knee
- reaching the range of motion of 0-110 degrees
- wound care
- an increase in walking distance
- working on a stationary bike
- sidestepping

Phase 3 (6-8 weeks)

- walking indoors without additional devices
- increasing full range of motion in the joint to 0-120 degrees
- endurance training
- walking without a cane.

II. Rehabilitation after hip replacement

In spite of the fact that there is no such thing as one-fits-all program, the latter is conditionally divided into 5 phases depending on how much time has passed after the operation:

- the day when the surgical intervention was performed is considered Phase 0;
- Day 1 to Day 4,
- Day 5 to Day 21,
- Week 4 to Week 8,
- Months 3 to 5.

The phase the patient is currently in determines the set and the intensity of exercise; the same applies to other therapeutic modalities.

The exercise after the hip replacement surgery may help recover faster. Exercise therapy begins shortly after the surgery, but initially only under the physician's supervision. At the initial stage, the load is minimal; the patient should not overburden the joint. Simple respiratory exercise in combination with isometric exercise are used.

A wedge-shaped pillow is used during the exercises so that the legs do not cross. It is also necessary to ensure that the operated leg does not bend more than a straight angle; no rotating movements are permissible.

General recommendations:

- the patient should exercise for 5-10 minutes several times a day;
- the load should be optimally dosed, with gradually increasing number of repeats;
- the breathing is calm and even;
- the movements are smooth and not abrupt;
- stop the exercise at a minimal sign of pain or discomfort.

The exercise after hip replacement may help restore the functions of the musculoskeletal system.

The exercise program is as follows:

- To prevent thrombophlebitis, it is recommended to move the ankle joint, i.e. alternating flexion and extension of the foot.

- Respiratory exercise: the patient should simultaneously make a slow inhalation and strain the muscles of the abdominal wall, back and thighs.
- Flex lower limbs at the knee in the supine position.
- Tighten the gluteal muscles for a few seconds.
- Raise the straight leg at a distance of 20 cm for 7-10 seconds.
- Raising the leg flexed in the knee joint, abducting backwards and to the side at a 45° angle, while leaning on the back of the chair.
- In a sitting position and holding on to a support, have the patient straighten their leg and pull their feet towards themselves and linger in this position for a few seconds.

We have performed rehabilitative interventions in 18 patients with hip fractures and subsequent hip replacement procedure in all of the 32 patients with hip fractures. All 18 patients in the observation group have reported substantial improvements in their condition.

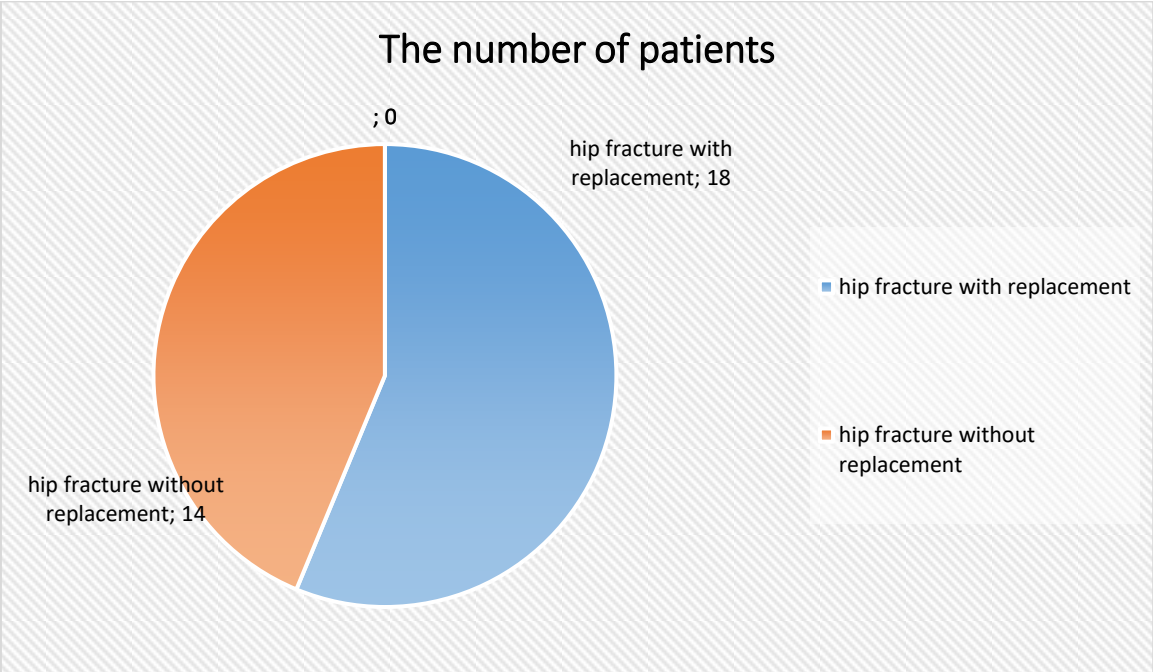


Figure 4.2. The number of patients with hip fractures without surgical treatment and with subsequent hip replacement procedure who took part in the study

The quality of rehabilitation determines the duration of the recovery period and the long-term consequences. This is why it is very important to skillfully select a procedure package tailored to each patient’s needs and make adjustments during the rehabilitation process as required.

CHAPTER 5
THE SPECIFIC FEATURES OF REHABILITATIONIN CARDIOVASCULAR DISEASE

When studying the basic principles and methods of patient rehabilitation at different stages, the program of rehabilitation in cardiovascular disease is used as a basis of rehabilitation in medical patients in many healthcare institutions. This is why the second series of our study enrolled 134 middle-aged and elderly patients with cardiovascular disease who required rehabilitative interventions.

According to recommendations, rehabilitation treatment in specialized rehabilitation departments of local cardiological health resorts is intended for patients who have had acute myocardial infarction, unstable angina pectoris or a surgical intervention.

Today, it is the cardiology service that has an especially extensive experience in the medical rehabilitation of patients. This is why the model of cardiac rehabilitation (in particular, the rehabilitation of patients with coronary artery disease/myocardial infarction) is used within the healthcare system as a model for the practical implementation of appropriate treatment for other medical patients.

There are rehabilitation programs for each stage of rehabilitation (i.e., inpatient, health resort and outpatient), which are based on the principle of strict individualization. This is why a clinical evaluation of the patient's health status is performed before the start of rehabilitation treatment, where one of the four functional classes is assigned to the patient, reflecting the depth and extent of the lesion, the complications and the degree of coronary insufficiency and clinical angina pectoris.

The efficacy of the rehabilitation process is evaluated using the method of ongoing and stage-dependent control, which ensures an adequate gradual expansion of patient's privileges and increase in physical activity in an individual patient. Constant monitoring of the functional state of the patient is

also allowing to evaluate coronary reserve and physical work capacity, and reflects how the clinical presentation of the disease changes with time.

Myocardial infarction is a disease characterized by formation of a necrotic focus in the myocardium as a result of impaired coronary circulation.

Clinical variants of myocardial infarction:

• anginal form is accompanied by a pronounced pain syndrome (in the form of attacks of pain) with location retrosternally or on the left side of the chest;

• asthmatic form, where the main manifestation is an attack of cardiac asthma and pulmonary edema, where pain syndrome is insignificant or absent;

• abdominal (gastralgic) form, with pain in the epigastric area, which is accompanied by nausea, vomiting, etc.

The basic principles of rehabilitation interventions in myocardial infarction. The following three stages of rehabilitation are distinguished in myocardial infarction:

- hospital phase (acute),
- healing phase,
- supportive phase.

The first phase occurs at a hospital stage, while the second and the third phase take place after hospital discharge, i.e. at the health resort, outpatient and follow-up stages.

The inpatient phase of rehabilitation:

• intensive care unit;

• infarction unit;

• rehabilitation unit (4-6 weeks).

Rehabilitation phase (healing):

• cardiological health resort (24 days);

• outpatient rehabilitation unit (6-8 weeks).

The supportive phase of rehabilitation:

• monitoring by the polyclinic cardiologist;

• health and physical education center;

• jogging and walking club;

• exercising independently in the home;

• exercising in health and fitness centers.

The inpatient (hospital) phase of rehabilitation has its own characteristics.

The following 4 physical rehabilitation programs are used taking the patient's condition into account:

• 3 week program in small focal myocardial infarction,

• 4-week program in large focal myocardial infarction,

• 5-week program in transmural myocardial infarction;

• Customized program in myocardial infarction with additional complications.

The main treatment objectives during the acute period of myocardial infarction include the following:

• limiting the infarction zone (thrombolysis, coronary angioplasty or an emergency coronary artery bypass grafting);

• preventing and eliminating the development of dangerous arrhythmias;

• preventing thromboembolic complications;

• prevention of left ventricular remodeling due to the use of drugs that reduce pre-load and post-load;

• reducing the effects of hypokinesia;

• patient's adjustment to gradual expansion of the physical activity;

• shaping an adequate psychological response of the patient to the disease.

Overall, it is worth mentioning that today it is the cardiology service that has an especially thoroughly developed experience in the medical rehabilitation of patients. This is exactly why the model of cardiac rehabilitation (in particular, the rehabilitation of patients with coronary artery disease [CAD]) is used within the healthcare system of many countries as a model for the practical

implementation of appropriate phased treatment and rehabilitation in other diseases.

We have also investigated the role of physical factors within the program of therapeutic, preventive and rehabilitative interventions in cardiovascular disease.

The basis for the physical rehabilitation of patients with MI includes an motor activity routine, exercise therapy and massage therapy. The program of physical rehabilitation begins from Day 2 of the disease after elimination of pain syndrome and when not contraindicated (contraindications include, but are not limited to, arrhythmia, high blood pressure, high-grade fever and generally serious condition of the patient).

In case of bed confinement, the patient may have regimen-appropriate exercise therapy (ET) when not contraindicated.

ET has the following objectives:

• prevention of complications;

• improvement of peripheral circulation and myocardial blood supply, as well as the mental state of the patient.

The ET program consists of slow movements in small and medium joints, head movements, short-term isometric tension and relaxation of the muscles in the lower extremities, and static respiratory exercise without deep breathing.

On Day 2, provided the patient's general condition is satisfactory, the patient may begin bending their legs without lifting the feet from the bed, lifting their body a little bit, and turning their torso to the right side. In case of a 3-week program, this is done on Day 1; in case of a 4- to 5-week program, this is done on Day 1 or Day 2. The duration of the exercise session is 8-10 minutes, repeated 2 times a day. Repeat slowly; 4-6 times for groups of small muscles, and 2-4 times for groups of medium and large muscles. The duration of this exercise regimen is 2-3 days.

Further expansion of patient's activity and transfer to a sitting position.

ET has the following objectives in this period:

• to stimulate extracardiac circulatory factors;

• to prepare and adapt the cardiovascular system to the sitting position;

• to teach the patient the elements of self-care.

The ET is carried out in the form of therapeutic exercise and morning "hygienic" exercise, as well as independent exercise 2-3 times a day. The duration is 15-17 minutes. The exercise program also includes vestibular apparatus training. The time of sitting in the bed is gradually increased: on Day 3 in case of a 3-week program, on Day 7-8 in case of a 4-week program, and on Day 8-10 in case of a 5-week program. When the patient's condition is stable, they may sit in their bed 3-4 times (15-30 minutes each). In this position, they may wash their face, comb their hair, brush their teeth, read, watch TV, etc. The duration of the exercise regimen is 7-10 days.

The objectives of ET during the partial bed rest period:

• to prepare and adapt the CV system to the upright position and walking;

• to continue stimulation of extracardiac circulatory factors;

• to stimulate the reparative processes in the myocardium and gradually train it;

• to expand physical activity;

• to prepare the patient for self-care.

Gradually, ET is supplemented by therapeutic walking. The duration of the session is 20-25 minutes. The patients gradually have more exercise for the torso and legs, including the movements in a sitting position that imitate walking, with transition to the standing position. On Day 2, the patient may walk 5-10 meters in their room, and then the walking distance is increased by 10 meters daily. At the end of the regimen, the patient should be able to walk 100 meters and spend 30-50% of the day's time in a sitting position. The duration of the exercise regimen is 7-10 days.

The ET during the free regimen is aimed at adapting the CV system to a gradual increase in physical challenge, to further expansion of motor activity, training to walk up the stairs and preparation for household workload.

The following modalities are used: ET, morning “hygienic” exercise, as well as independent exercise 4-5 times a day and therapeutic walking. The exercise that involves all muscle groups are more complex. Dumbbells 0.5 kg are used. Original stances are sitting and standing. The duration is 25-30 minutes. Walking in the corridor is added. The patient exits their room/ward for the first time on Day 8-10 in case of a 3-week program; on Day 18-20 in case of a 4-week program, and on Day 22-24 in case of a 5-week program. After walking 150-200 m along the corridor, the next task for the patient is to walk up a stairs. The first time, it’s only 2-3 steps, increasing by the same number each next day.

Then the patient will have walks 2 times a day, 500-600 meters at a time, at the pace of 70-80 steps per minute, gradually followed by 1-1.5 km, at the pace of 80-90 steps per minute. The duration of the regimen is 10-15 days. In the final period of the motor activity regimen, the hospital stage reaches a level of physical activity where the patient can already be discharged from the hospital (i.e. the patient is able to walk up the stairs, walk 1-3 km and perform unassisted self-care). Such a patient may be referred to a local cardiological health resort for further rehabilitation. This occurs on Day 21-23 in case of a 3-week program, on Day 30-32 in case of a 4-week program, and on Day 35-37 in case of a 5-week program.

Individual program is used to conduct rehabilitation in patients with severe complications of myocardial infarction, namely:

- recurrent course of disease;
- Class IIB-III circulatory failure;
- arrhythmia;
- thromboembolic complications;
- the state of clinical death;

• cardiogenic shock;

• acute cardiac aneurysm.

After completion of the hospital stage of rehabilitation, the patients should be completely prepared for transition to a specialized rehabilitation unit or cardiological health resort, or to be discharged home.

The specific features of the health resort-based and outpatient stages of rehabilitation.

The health resort-based stage of rehabilitation is conducted in local cardiological health resorts. The patients may be transferred to a health resort (taking contraindications into account) no sooner than in 20 days from the onset of the disease in small focal MI, and no sooner than in 30 days in large focal MI or complicated small focal MI, when the patient reaches a certain physical activity level.

Contraindications to treatment in a rehabilitation unit of a health resort are as follows:

• general contraindications to health resort treatment;

• heart aneurysm;

• aortic aneurysm in a patient with heart failure worse than Class I;

• Stage III hypertension;

• recurrent thromboembolism;

• disturbances of cerebral circulation;

• decompensated or severe diabetes;

• a disease with significant dysfunction of organs and systems.

The main objectives for the treatment of patients with MI at the health resort-based stage of rehabilitation are as follows:

• secondary prevention of CAD progression;

• prevention of recurrent MI;

• elimination or reduction of physical disability in the patients;

• preparation for occupational/professional activity.

A rehabilitation physician/physiatrist or a cardiologist develops a customized rehabilitation program for each patient in the rehabilitation unit of a local cardiological health resort. The details of the program depend on the severity of the patient's condition (primarily complications and the degree of coronary insufficiency), and is determined by the functional class of the patient's disease.

The health resort-based stage of rehabilitation involves a significant increase in the intensity of physical activity during physical rehabilitation, primarily due to ET and walking exercise.

The training regimen is not prescribed for all patients; only for those who have successfully mastered the physical activity of the previous regimens and are free from arrhythmias, circulatory failure, and manifestations of angina pectoris.

The outpatient follow-up stage is the stage when the therapeutic process is completed. After this, the patient’s condition and rehabilitation outcomes are evaluated, the issues of performance in the workplace are managed, the timing of restoration of employment is decided, and a decision is made whether the patients needs a disability status (either temporarily or permanently).

The maintenance period begins from the 3-4th month from the onset of the disease and lasts for the entire remaining life of the patient.

The main objectives of this stage are as follows:

• follow-up care and monitoring;

• preventing CAD progression and aggravation and recurrent MI;

• assessment of the patient’s ability to work, maintaining or improving it;

• preparing the patient for their occupational/professional activity;

• achieving the maximum possible social readjustment;

• selection of patients who may benefit from health resort treatment.

The physical rehabilitation program is started from the same level of physical challenge, which was attained prior to discharge from the health resort, taking the functional class of the disease into account. The physical challenge

should be regular and systematic, with gradual increase, and take into account their tolerance.

The emerging signs of abnormal response call for immediate discontinuation of the activity; an intermediate/borderline response calls for suspension of ET until functional recovery.

An effective psychological rehabilitation modality is an MI school, which covers all the issues needed for the patients and their families concerning restoration and strengthening of health.

We may come at a conclusion that health resort-based stage of rehabilitation is conducted in local cardiological health resorts. The patients may be transferred to a health resort (taking contraindications into account) no sooner than in 20 days from the onset of the disease in small focal MI, and no sooner than in 30 days in large focal MI or complicated small focal MI, when the patient reaches a certain physical activity level.

Restoration of occupational/professional activity is occurring gradually. From the partially restricted workplace duties, when watchful waiting is ongoing, the patient is gradually returning to the full scope of professional duties available for the patient. Restoration of occupational/professional activity is not only the ultimate goal of rehabilitation, but also a powerful means to restore the psychoemotional sphere. The vast majority of people who have had a first myocardial infarction or other cardiovascular diseases fully recover and are afterwards still engaged in full-fledged activities for a long time.

CHAPTER 6

REHABILITATION OF PATIENTS WITH CERTAIN TYPES OF INJURIES, SUCH AS THORACIC TRAUMA, ABDOMINAL TRAUMA, AND PATIENTS AFTER SURGICAL INTERVENTIONS ON URINARY SYSTEM

Rehabilitative interventions in thoracic trauma. Patients with thoracic injuries are prescribed bed rest of individual duration, which depends on the nature of injury or disease and the surgical treatment performed. Such patients are placed in a Fowler's position, which facilitates breathing, cardiac activity and expectoration. During 1-2 days after the injury and thoracic surgery, the patients remain in intensive care units equipped with mechanical ventilation, central oxygen supply, a set for pleural puncture and venesection, drums with sterile material, etc.

When providing care to the injured and operated thoracic patients, the nurse should carefully monitor the drainage tubes inserted into the pleural cavity for fluid and air removal.

One of the severe complications after chest injuries and thoracic surgeries is pneumonia and pulmonary edema. To prevent pneumonia and atelectasis, along with active patient management (early ambulation, breathing exercises, expectoration and routine ET use) it is necessary to use antibiotic therapy, as well as cardiac and respiratory drugs.

Thoracic procedures are associated with significant surgical trauma; they are often performed using cardiopulmonary bypass and artificially controlled respiration. In the early postoperative period, the nurse is fulfilling doctor's orders, such as drug treatment (antibacterial therapy, infusion therapy and desensitizing therapy), ET (in order to prevent congestive pneumonia) and physical therapy (prevention of pleural adhesions).

Already in the preoperative period, the nurse should teach the patient how to expectorate with minimal discomfort, how to turn to their side, to elevate

the pelvis in the supine position, to train the abdominal type of breathing, to strengthen the respiratory muscles, and help the patient master the exercises and useful motor skills, which the patient will need in the postoperative period.

In the remote postoperative period, the patient will continue the treatment started at the inpatient stage, while expanding the ET program under the guidance of physical therapist. Massage therapy and electric therapy may be used as needed.

In lung resection, the average minimal time to regain working capacity is 3 months. To facilitate and accelerate occupational readjustment, it is reasonable to temporarily assign less demanding work tasks to such patients. Hypothermia, night shift work and sleep deprivation affect occupational rehabilitation in an adverse way. Household rehabilitation includes teaching the patient self-care skills.

We may come at a conclusion that patients with thoracic injuries are prescribed bed rest of individual duration, which depends on the nature of injury or disease and the surgical treatment performed.

Rehabilitative interventions in abdominal trauma. Each surgical patient needs an individualized approach, especially after a surgical intervention.

In the early postoperative period, medical rehabilitation is conducted by the surgical department nurse, whose scope of practice includes:

• monitoring the patient's personal hygiene;

• accurate execution of all physician’s orders, while adhering to the procedural techniques and the patient’s medical records;

• monitoring the course of the disease and the condition of the patient, and informing the physician on any changes;

• implementing nursing interventions;

• feeding the patient.

In the postoperative period, any deficiencies and/or complications of surgical interventions are identified; surgery-related symptoms improve and issues of occupation readjustment are dealt with.

Quite often, a surgical intervention does not allow elimination of the comorbidities that accompany biliary tract disease, peptic ulcer, etc.

In patients with a history of biliary tract disease of more than one year, 2/3 have a morphological liver injury, such as development of interstitial fibrosis up to cholangiogenic cirrhosis, angiocholitis during exacerbations of chronic cholecystitis, as well as granular and fatty degeneration. Therefore, at the third postoperative stage, i.e. during outpatient patient monitoring, follow-up assessments of relevant organs (the liver, the pancreas, etc.) should be carried out.

In the early postoperative period, the nurse is conducting ET as ordered by the physician:

• on Day 1-2, it is recommended to turn in the bed towards the surgical wound (with the assistance of health care personnel, family, and then independently);

• the nurse is teaching the patient to breathe properly and to support the surgical wound with their hand when coughing;

• the nurse recommends active range of motion movements first in the hands and feet, then in large joints (imitation of walking, flexion at the joints and abduction of the legs);

• the nurse recommends the patient to stand up and walk on Day 2-3 depending on the severity of surgery, and to slowly walk up the stairs on Day 5-10;

• the nurse may perform massage as ordered by the physician.

The late postoperative period involves both the family nurse and the physiatrist. Their objectives are as follows:

• informing the physician about the patient's health status;

• fulfillment of orders, carrying out manipulations;

• timely referral of patients for examinations, and monitoring their visits to health specialists;

• medical record keeping;

• patient education activities (the main objective of such activities is to improve compliance with the recommendations of the surgeon, physician's assistant and family nurse).

Each surgical patient needs an individualized approach, especially after a surgical intervention. In the early postoperative period, medical rehabilitation is conducted by the surgical department nurse.

Medical and social rehabilitation after interventions on organs of the urinary tract. Patient activation and prevention of complications after interventions on organs of the urinary tract involves the same interventions as after abdominal surgery. As ordered by the urologist, the nurse is teaching her patient how to perform breathing exercises and to move the extremities. The patient shall get up from their bed on Day 2-3, with subsequent addition of ET exercise.

In the late postoperative period, the family nurse monitors compliance with the urologist recommendations, such as drug therapy, exercise therapy, diet therapy (if oxalate salts are detected in the general urine test, it is recommended to exclude tea, beets, spinach and legumes from the diet; if urate salts are detected, the excluded foods should include meat broths, processed foods, hard cottage cheese and honey).

In case there is a complication of the disease and the patient cannot resume their previous occupation, the patient is referred to a disability expertise panel, which determines the patient's capacity to perform a specific amount of work or assign a disability category to the patient. Patient activation and prevention of complications after interventions on organs of the urinary tract involves the same interventions as after abdominal surgery.

The third series of our study enrolled 97 patients who required rehabilitation in connection with thoracic trauma (32 patients), abdominal trauma (27 patients) and after surgical interventions on urinary system (38 patients).

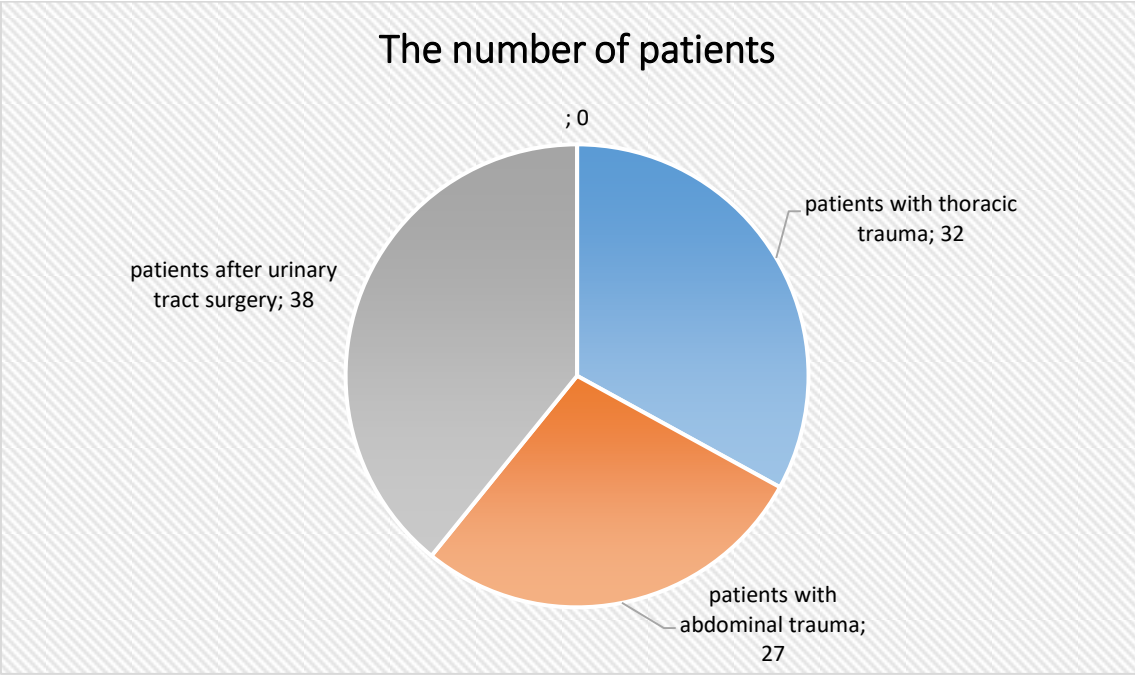


Figure 6.1. The number of patients with thoracic trauma, abdominal trauma, and patients after surgical interventions on urinary system who took part in the study

It is worth mentioning that after rehabilitative interventions all patients experienced positive changes in all functional indices of the damaged organs and systems.

CHAPTER 7
REHABILITATION OF PATIENTS WITH SPINAL FRACTURES AND PATIENTS WITH NERVOUS SYSTEM DISEASES

The fourth series of our study enrolled 43 patients who have had rehabilitation in connection with a spinal fracture (6 patients) or neurological disorders (37 patients).

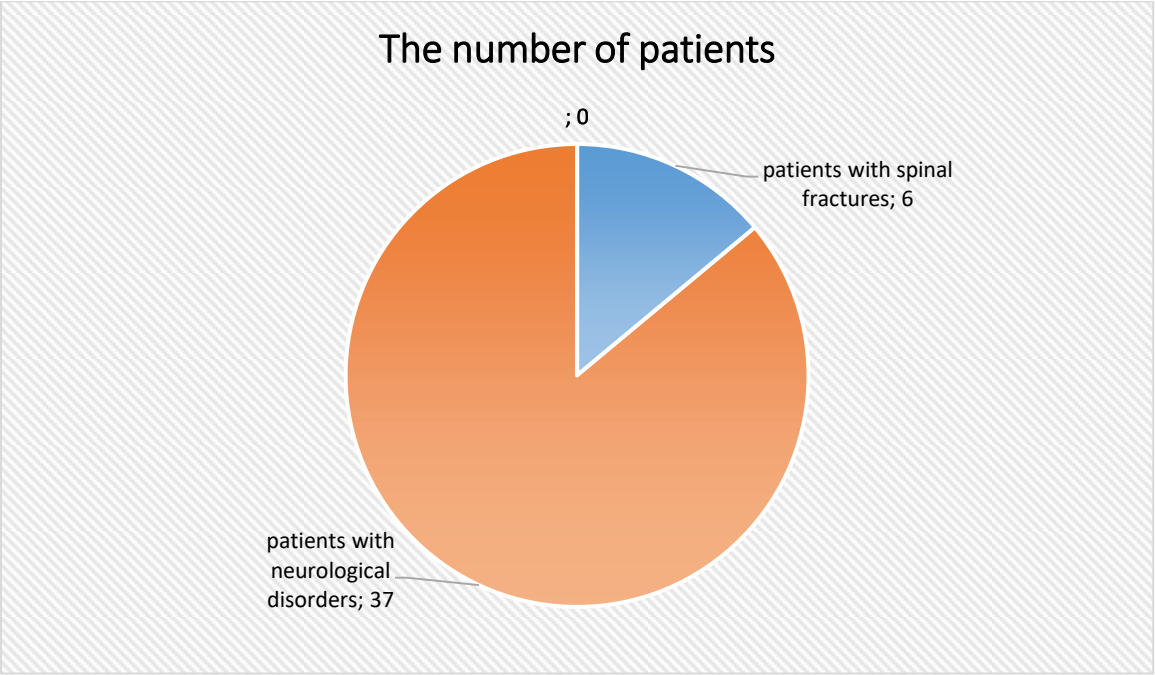


Figure 7.1. The number of patients with spinal fractures or neurological disorders

Social and medical rehabilitation in spinal fractures. Spinal fractures belong to severe musculoskeletal damage. They result in compromises of the supporting, shock-absorbing, motor and protective (in relation to the spinal cord) functions of the spinal column and are often accompanied by spinal cord injuries.

The traumatic disease in spinal injuries involves the following 4 periods:

I period of 2-3 days includes an unfolded presentation of spinal shock;

II period lasts 2-3 weeks and is accompanied by manifestations of spinal shock, impaired blood and lymph circulation, edema and swelling of the spinal cord;

III period lasts approximately 2-3 months and is characterized by diminishing manifestations of spinal shock and detection of the true nature of spinal cord injury;

IV period lasts 2-3 years and longer, with gradual recovery of impaired spinal functions.

The following abnormalities are developing below the site of injury:

• motor disorders (paralysis, paresis);

• sensory loss;

• trophic disorders (atrophy, ulcers, decubitus);

• pelvic organ dysfunctions.

The most widely used method of functional treatment in spinal fractures is to put the patient on a hard bed with a wooden shield placed under the mattress immediately after injury. Cotton-gauze rollers are placed under the cervical and lumbar areas. At the same time, spinal traction is performed using the patient's own body weight.

To prevent trophic disorders in the area of the shoulder blades, elbows, sacrum and heels, it is necessary to perform hygienic massage, wipe the patient's skin with a mixture of water with camphor alcohol (2 tablespoons per 0.5 water), and, in case of pressure ulcers, use dressings with antiseptic solutions.

The specific features of care for patients with spinal injuries during the hospital and post-hospital period include the following:

• regularly change the patient’s position in the bed, prevent ulcers and use massage;

• ensure urine output by inserting a soft elastic catheter with adherence to aseptic precautions and scheduled irrigation with aseptic solutions;

• prevent urological complications;

• vacate the rectum of the feces (enemas);

• prevent foot deformities and contractures (fixation of feet at an angle of 90 degrees).

The post-hospital rehabilitation period is conducted in an outpatient setting, in a specialized health resort or in a rehabilitation center (the modalities used in such institutions include exercise therapy, massage therapy, physical therapy, electric therapy and work therapy).

In a favorable course of treatment, the patients may resume work in 4-5 months after an injury with restriction on lifting and handling weights, working in a bent position and long commutes and travel. Disability category is established for the patients who have pronounced vertebrogenic and radicular syndromes, spinal deformities with an unfavorable clinical prognosis and for those who need physical assistance.

Spinal fractures belong to severe musculoskeletal damage. They result in compromises of the supporting, shock-absorbing, motor and protective (in relation to the spinal cord) functions of the spinal column and are often accompanied by spinal cord injuries.

The main objectives of restorative treatment in neurological disorders. Rehabilitation of patients with injuries and diseases of the nervous system is of a great social significance.

The clinical presentation of nervous system damage consists of deficits in physical mobility, sensitivity, speech, coordination and cranial nerve functions, as well as trophic, autonomic vascular and mental disorders.

People with limited mobility constitute the main part of such patient population; they have more pronounced activity and self-care deficits and as such require physical assistance and prolonged medico-social rehabilitation. Among neurological disorders, the most widely spread entities include cerebrovascular accidents, neurological manifestations of degenerative disc disease and cerebral and spinal injuries. Three levels of rehabilitation are distinguished:

• the first level (regeneration): the impaired function returns to or approximates baseline;

• the second level (compensation): the compensatory restructuring and functional involvement of cerebral structures and systems that have not been previously involved;

• the third level (re-adjustment) means adjustment to the existing deficiency.

The nurse is playing a crucial role in implementation of rehabilitative interventions. In addition to the fulfillment of doctor's orders and direct patient care, the scope of nursing duties includes implementation and monitoring of general medical and psychotherapeutic regimens, establishing contact with the patients, transporting the patients to procedure rooms, activation and early ambulation of patients within their respective therapeutic regimens, teaching the patient to transfer from a supine position into a sitting/standing position; physical exercise and training, walking, assisting the patients with ET, self-care skills training, teaching the patient how to use exercise equipment and having a psychotherapeutic influence on the patients.

The importance of physical, psychological and occupational rehabilitation. Many patients with nervous system damage have asthenic manifestations (irritability, tearfulness, sleep disorders, etc.); they may develops a sense of self-doubt, inferiority and anxiety, as well as being fixed on their deficiency and various painful sensations. The patient loses faith in the possibility of recovery; against this background, they may have thoughts of suicide and suicidal attempts. The nurse should be especially attentive to such patients.

Other patients, on the contrary, underestimate their health problems, have poor medication compliance and break the hospital rules.

Psychotherapy is one of the main components of the rehabilitation program. Common psychotherapeutic modalities include rational therapy (conversations), autogenic training, self-hypnosis and group therapy.

The exercise routine is developed separately for inpatient, health resort and outpatient stages of rehabilitation tailored to the needs of the patient.

All patients in this study series experienced lasting physical and psychological improvements after completion of rehabilitative interventions.

CONCLUSIONS

1. The authors have studied the basic principles of rehabilitative interventions.

2. The authors have determined the importance of physical and psychological rehabilitation and to study the mechanisms of health-improving effects of rehabilitative interventions.

3. The authors have investigated the specific features of rehabilitation in elderly patients with musculoskeletal damage.

4. The authors have studied the specific features of rehabilitation in cardiovascular disease.

5. The authors have defined the basic principles of rehabilitation of patients with certain types of injuries, such as thoracic trauma, abdominal trauma, and patients after surgical interventions on urinary system.

6. The authors have determined the basic principles of rehabilitation of patients with spinal fractures and patients with nervous system diseases.

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