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EVALUATION OF EFFICIENCY OF INDIVIDUAL COMPLEX REHABILITATION OF PATIENTS BASED ON THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING

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Abstract. Evaluation of efficiency of individual complex rehabilitation of patients based on the international classification of functioning. Ipatov A.V., Sanina N.A., Khanyukova I.Y. *In order to determine the possibility of using a rehabilitation profile to assess the effectiveness of rehabilitation and develop a methodology for quantifying the effectiveness of rehabilitation measures in the short term in inpatients of the State Institution "Ukrainian State Research Institute of Medical and Social Disability of the Ministry of Health of Ukraine" we created a rehabilitation profile of the patient based on the principles of the International Classification of Functioning, Disability and Health (ICF). There were analyzed rehabilitation profiles of 522 patients with therapeutic pathology, musculoskeletal system diseases, and eye diseases. Rehabilitation of patients was comprehensive, with the use of methods of medical, psychological, and physical rehabilitation. The severity of dysfunctions was assessed by a quantitative scale from 0 to 4 points, where "0" – no issues, and "4" – extremely serious issue. The evaluation was performed twice by members of the multidisciplinary team: at the initial examination of the patient and at the discharge from the clinic. The statistical method and the method of expert evaluations were used to process the research results. The licensed software MS Excel for Windows was used. The study found that the proposed method of assessing the effectiveness of short-term rehabilitation is accurate and objective, it considers the initial functional status of the patient and allows to assess the quality and effectiveness of rehabilitation measures both at the patient level and institution. Its implementation will provide a unified approach to the provision of rehabilitation measures and to draw conclusions about the effectiveness of rehabilitation activities of the medical institution differentially, considering the type of pathology, leading limitations of life, severity of disorders, age of patients.*

Реферат. Оценка эффективности индивидуальной комплексной реабилитации больных на основе международной классификации функционирования. Ипатов А.В., Санина Н.А., Ханюкова И.Я. *С целью определения возможности применения реабилитационного профиля для оценки эффективности реабилитации и разработки методики количественной оценки эффективности реабилитационных мероприятий на краткосрочном интервале у стационарных больных на базе Государственного учреждения «Украинский государственный научно-исследовательский институт медико-социальных проблем инвалидности МЗ*

Украины» была проведена оценка качества реабилитации с помощью создания реабилитационного профиля пациента на основе принципов Международной классификации функционирования, ограничения жизне-деятельности и здоровья (МКФ). Проанализированы 522 карты реабилитационного профиля у больных с патологией внутренних органов, опорно-двигательного аппарата, заболеваниями органа зрения, которые находились на стационарном лечении. Реабилитация пациентов была комплексной, с применением медицинской реабилитации, методов психологической и физической реабилитации. Выраженность нарушений функций оценивалась по количественной шкале от 0 до 4 баллов, где «0» – нарушений нет, а «4» – крайне тяжелые нарушения. Оценивание проводилось членами мультидисциплинарной команды дважды: при первичном осмотре пациента и по завершении срока пребывания в клинике. Для обработки результатов исследования использовался статистический метод и метод экспертных оценок. Использовалось лицензионное программное обеспечение MS Excel for Windows. Проведенным исследованием установлено, что предложенный метод оценки эффективности краткосрочной реабилитации является точным и объективным, он учитывает начальный функциональный статус больного и позволяет провести оценку качества и эффективности реабилитационных мероприятий как на уровне пациента, так и на уровне учреждения в целом. Его внедрение позволит обеспечить единый подход к оказанию реабилитационных услуг и сделать выводы об эффективности реабилитационной деятельности медицинского учреждения дифференцированно с учетом вида патологии, ведущих ограничений жизнедеятельности, степени тяжести нарушений, возраста пациентов.

According to the Law of Ukraine "On Reha-bilitation of Persons with Disabilities in Ukraine", "rehabilitation of persons with disabilities – a system of medical, psychological, pedagogical, physical, professional, labor, physical culture, sports, social and household activities aimed at providing assistance to persons in restoration and com-pensation of disturbed or lost body functions to achieve and maintain social and material inde-pendence, labor adaptation and integration into society, as well as providing persons with disabilities with technical and other means of reha-bilitation and medical devices "[4].

One of the important final stages of medical rehabilitation technology is the assessment of its effectiveness. Of course, in each case the result will be different and will depend on a number of factors, the main of which are: the severity of disorders and limitations of life before rehabilitation; duration of the disease; the presence of concomitant somatic pathology and its severity; the nature of the underlying disease. There are currently no uniform approaches to performance evaluation. Some authors believe that to assess the effectiveness of medical rehabilitation the type of disease, the number of exacerbations before and after rehabilitation should be taken into account [10]; others – to assess the effectiveness of medical rehabilitation by analyzing the dynamics of visits to the clinic, cases of inpatient treatment and temporary disability [9]; others propose to assess the medical rehabilitation of persons with disabilities by indicators of the dyna-mics and burden of the disability group [5].

In order to assess medical rehabilitation of persons with disabilities, it is definitely necessary to take into account not only medical aspects, but also those related to social and economic aspects. Thus, some sources suggest the use of the following methods as an assessment of the effectiveness of medical rehabilitation: the method of assessing the dynamics of the functional class of the main disorder or defect, household tasks and their performance; method of estimating the dynamics of the frequency of exacerbations and events; method of assessing the subjective satisfaction of patients and persons with disabilities in the course of rehabilitation [2].

J. Lexell and C. Brogardh [9] suggest that in patients with post-stroke movement disorders (which can be applied to other patients with movement disorders) to use four features (motor functions, general physical condition, self-care and household activity, work capacity) to assess the effectiveness of rehabilitation, and criteria of efficiency allow to refer the patient to certain clinical and rehabilitation group depending on restoration of this or that sign.

However, it is desirable to have a single, gene-ralized assessment of the patient's condition before and after rehabilitation. To date, such an assessment does not exist. After all, the question of what such an assessment should include is being discussed. There are five main aspects: physical health, mental health, level of independence in daily life, social health and economic functioning (provision) [6, 8, 10]. However, if the state of physical health (based on general self-esteem, detection of symptoms that are characteristic of a disease, etc.) and daily activities (based on the patient's ability to live independently or the need for outside help) can be assessed reliably, then the assessment of social health is quite subjective, the assessment of mental health is a rather difficult task due to the lack of a clear definition of this condition [3], and economic security does not always depend only on the state of health.

Therefore, taking into account all the above, the criteria for the effectiveness of rehabilitation must meet the following requirements: universality – the possibility of application in different diseases and in the work of different rehabilitation departments; unification of methods of assessment of different aspects of rehabilitation (functional, household and social recovery); the ability to express the assessment in digital terms; simplicity and availability of assessments, the possibility of their application in clinical practice.

Therefore, we proposed a method of assessing the effectiveness of medical rehabilitation which would meet all the above characteristics.

The purpose of the work is to determine the possibilities of applying the rehabilitation profile to assess the effectiveness of rehabilitation and to develop a methodology for quantitative evaluation of the effectiveness of rehabilitation measures in the short term in inpatients.

MATERIALS AND METHODS OF RESEARCH

On the basis of the State Institution "Ukrainian State Research Institute of Medical and Social Problems of Disability of the Ministry of Health of Ukraine" the quality of rehabilitation was assessed by creating a rehabilitation profile of the patient based on the principles of the International Classification of Functioning, Limitation of Life and Health. A total of 522 rehabilitation profile maps were analyzed in patients with pathology of internal organs, musculoskeletal system, and diseases of the visual organ who were hospitalized. Rehabilitation of patients was comprehensive, using both methods of medical rehabilitation (drug treatment, restorative surgery, etc.) and methods of psychological (art therapy, group and individual psychotherapy and psychocorrection) and physical (physiotherapy, physiotherapy, etc.) rehabilitation.

The rehabilitation profile was based on the so-called "Minimum set of IFC categories", which is a quantitative tool developed on the basis of IFC [6]. This set is universal in use, regardless of the nosological form, and allows you to assess the main limitations of the patient's life. These include categories such as b130 (volitional and traction functions), b152 (emotional functions), b280 (a sense of pain), d230 (daily routine), d450 (walking), d455 (moving in ways other than walking), and d850 (paid work). The severity of disorders of these functions is assessed on a quantitative scale from 0 to 4 points, where "0" – no disorders, and "4" – extremely serious disorders (Fig.).

The initial assessment of the patient, which was conducted by members of the multidisciplinary team on admission to the hospital, the purpose of rehabilitation and the relationship of existing disorders in the patient with the purpose was established. Then it was necessary to indicate the target values of life limitations that were planned to be achieved at the end of the rehabilitation program. At the end of the patient's stay in the clinic, a final assessment of his rehabilitation profile was performed, indicating whether the purpose of rehabilitation had been achieved.

To process the results of the study, the statistical method and the method of expert assessments were used [1]. The licensed software MS Excel for Windows $^{©}$ was used (licensed product Microsoft 365, 00 licenses 00201-11617-43662-AA947). The proposed rehabilitation profile and methods of quantitative evaluation of the effectiveness of short-term rehabilitation were developed by the team of authors of the article.

RESULTS AND DISCUSSION

Analysis of rehabilitation profile cards in patients with therapeutic pathology showed that the main goals of rehabilitation in this cohort were: stabilization of blood pressure, improvement of respiratory function, reduction of pain, increased tolerance to exercise, normalization of carbohydrate metabolism.

The predominant disorders were: severe and moderate ambulation disorders (d450, in 56.2±2.8% of patients) and daily routine performance (d230, in 67.1±3.1% of patients), moderate pain (b280, experienced by 34.0±1.5% of patients). The proportion of patients in whom the purpose was achieved was quite high and averaged 82.0% (in the therapeutic department 81.7±1.2%, in the cardiology department – 80.9±0.9%, in the rehabilitation department – 83.4±2.0%).

In the analysis of rehabilitation measures carried out in patients with pathology of the visual organ, it was shown that the main purposes of rehabilitation were to improve visual functions and general condition of the patient. The predominant disorders in these patients were mostly impaired visual function of moderate and severe degree (b210, 96.1±2.3% of patients) and severe restriction of daily routine (d230, 97.1±2.0% of patients), which in most cases occurred as a result of disorders of the visual organ. The percentage of purpose achievement in the ophthalmology clinic was quite high, almost all patients (96.3±2.0%) reached the target significance of the disorders.

Department _____

Name. _____   **Date of hospitalization** _____

ICD-10 disease code_____   **Date of discharge** _____

IFF category		The severity of the disorder					Relation to the purpose of rehabilitation	Target value	The severity of the disorder				
Upon admission to the hospital (initial inspection)									**After completion of treatment (rehabilitation)**				
		0	1	2	3	4			0	1	2	3	4
b130	**Volitional functions and train functions**												
b152	**Functions of emotions**												
b280	**Sense of pain**												
d230	**Execution of daily routine**												
d450	**Walking**												
d455	**Moving in ways that are different from walking**												
d850	**Paid work**												
The purpose of rehabilitation									**Purpose of rehabilitation:** ○ **Completely achieved** ○ **Achieved partially** ○ **Not achieved**				

Doctor _____   **Head of department** _____

Rehabilitation specialist _____

Members of a multidisciplinary team:

_____

Rehabilitation profile form for IFC

In patients with orthopedic and traumatological pathology, pain was one of the predominant disorders (b280, 84.2±2.3% of patients); almost all patients reported pain of moderate to severe intensity. Also, one of the leading disorders was moderate and severe ambulation disorder (d450, 65.1±1.8% of patients) and severe impaired moving in ways other than walking (d455, 79.7±1.7% of patients). Accordingly, the main goals of rehabilitation were to reduce or completely eliminate the pain syndrome, as well as to restore the function of movement by increasing the volume of movements in the affected joints, surgical interventions aimed at restoring bone integrity, and so on. Full achievement of the purpose of rehabilitation was observed in 86.8±2.4% of cases.

As for patients with pathology of the nervous system, there were predominant disorders of the psycho-emotional sphere – moderate and severe disorders of emotional function (b152, 55.0±1.2% of patients) and volitional functions (b130, 49.1±1.0% patients), again, the functions of movement (walking and other modes of movement were affected in 34.1±0.8% of patients), impaired to a severe extent; and 32.1±0.4% of patients suffered significant pain, moderate or expressed. The purposes of rehabilitation of neurological patients were quite diverse, depending on the nosology – reduce in the severity

of pain, improvement of emotional response, reduce in seizures, improvement of walking function, the ability to perform a daily routine and more. The purpose was fully achieved in 90.1±1.7% of treated patients.

When analyzing cards of patients with surgical pathology, it was found that in 78.3±1.7% of patients there was a sense of pain (from mild to severe). All other disorders were also present in the majority of patients, but their manifestations were mild or moderate and rarely reached a significant degree. Accordingly, one of the main purposes of rehabilitation was the elimination or reduction of pain; the full achievement of this purposes was recorded in 80.1±1.2% of cases.

We also analyzed the percentage of coverage of patients with various rehabilitation measures. It is shown that the main methods of rehabilitation that helped to achieve the purposes were medical or surgical treatment of the underlying pathology according to generally accepted standards. They were used in 100.0% of patients hospitalized. Methods of physical rehabilitation were also very actively used and covered 79.8% of patients. All patients who were found to have emotional and volitional disorders received psychological support, this percentage reached 45.1%. After psychological counseling, patients were involved in the format of group and / or individual psychotherapy, with using the techniques of art therapy, psychoanalysis, etc.

To calculate the coefficient of rehabilitation efficiency we chose the parametric method. This method is common in practice and easy to use. The parametric method involves comparing two key parameters: the patient's initial state and his current state. To use it, you need to know the patient's condition "at the entrance" (in our case, on admission to the hospital) and "at the exit", i.e. after the rehabilitation period. The difference between these two parameters is a "rehabilitation effect", or a result that indicates the effectiveness of the provided rehabilitation measures, organization of rehabilitation, staff qualification and so on. Parametric techniques can be applied not only after the completion of a certain rehabilitation stage, but also at intermediate points, which allows to make the necessary corrections to the rehabilitation process.

The initial parameter was the sum of points on seven indicators of the rehabilitation profile, available at the time of hospitalization. The final parameter is the sum of points on the day of discharge from the hospital. The duration of hospitalization averaged 12 days, i.e. the effectiveness of short-term rehabilitation was evaluated.

From the modern point of view, the rehabilitation effect is considered as the improvement of clinical and functional condition, physical capabilities, psychophysiological status, standard of living, professional and socio-environmental status, in general, improvement of the quality of life of a person with disabilities and promoting his/her integration into society.

Our proposed indicator of the effectiveness of rehabilitation measures (Re) is calculated by the formula for calculating the percentage of growth:

$$Re = (B*100/A) - 100,$$

where A – the initial sum of points; B – the sum of points at the discharge of the patient, i.e. at the end of rehabilitation.

When calculating the effectiveness of rehabilitation there is a need for a procedure of gradation of the obtained data, their transfer to a unified scale. To implement this procedure, it is possible to use the so-called independence functions which are designed to transfer natural values into a single dimensionless numerical scale with fixed limits.

We used the Harrington independence function:

$$\ln d(z_i) = -e^{-x_i},$$

$$z_i = \frac{x_i - x_{iB}}{x_{iB} - x_{iH}}$$

where d – independence function;
z_i – the value of the i-th indicator in conventional units;
x_i – the value of the i-th indicator in the output scale;
x_{in}, x_{iv} – lower and upper limits of the norm.

After gradation and reduction of the initial indicators to the interval [0-1] we obtained the following expression:

$$e = \sqrt{\frac{(d_1-1)^2 + (d_2-1)^2 + ... + (d_i-1)^2}{n}} - \sqrt{\frac{1}{n}\sum_{i=0}^{n}(d_i-1)^2},$$

where d_i – the value of the initial indicators x_i, reduced to the interval [0–1];
n – the number of indicators.

In the final version, the value of Re can be represented as a percentage. The range of Re values from 0 to 100 can be divided at the level of rehabilitation efficiency as follows (Table).

Thus, we obtained a quantitative indicator of the effectiveness of rehabilitation measures at the level of a patient, the calculation of which allows to objectify the evaluation of the quality of rehabilitation measures.

Quantitative indicator of effectiveness of rehabilitation measures

Value of Re	Effectiveness of rehabilitation
0-5%	absent
6-20%	satisfactory
21-50%	high
> 50%	very high

CONCLUSIONS

1. With the use of the rehabilitation profile it became possible to accurately determine the need for the methods of non-medical rehabilitation of patients staying in the clinic, the breadth of coverage of psychotherapeutic programs, methods of physical rehabilitation.

2. It is shown that most of patients experienced ambulation disorders (56.2±2.8% of patients), daily routine performance (67.1±3.1% of patients), pain (34.0±1.5% of patients); psycho-emotional disorders were quite common (55.0±1.2% of patients), which necessitated the provision of specialized psycho-therapeutic care.

3. Rehabilitation profile is a modern and highly effective tool for conducting and evaluating the quality of rehabilitation measures, and its application is in full compliance with the concept of health care reform in Ukraine on the basis of the IFC.

4. The proposed method of evaluation of the effectiveness of short-term rehabilitation is accurate and objective, it takes into account the initial functional status of the patient and allows to assess the quality and effectiveness of rehabilitation measures both at the level of a patient and institution as a whole. Its implementation will provide a unified approach to the provision of rehabilitation measures and to draw conclusions about the effectiveness of rehabilitation activities of a medical institution differentially considering the type of pathology, leading limitations of life, severity of disorders, age of patients.

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