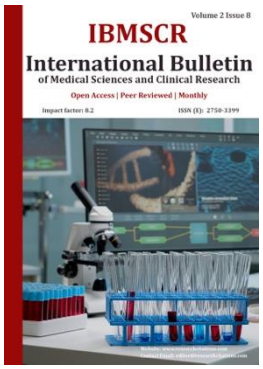

ASSESSMENT OF QUALITY OF LIFE AS AN INTEGRAL CRITERION FOR REHABILITATION OF PATIENTS AFTER ISCHEMIC STROKE DURING THE RECOVERY PERIOD

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Resume: Ischemic stroke (IS) is one of the leading causes of temporary or permanent disability, which is caused by the development of focal neurological symptoms. Assessment of the quality of life of patients after a stroke is an important criterion for analyzing the effectiveness of applied rehabilitation approaches and serves as an integral indicator of the general state of health after a vascular event.

The purpose of the study: To study the dynamics of quality of life in patients with hemispheric ischemic stroke during the recovery period (within one year) as an integral indicator of the effectiveness of complex rehabilitation.

Materials and methods: The study included 123 patients aged 40 to 80 years who had suffered an ischemic stroke and were in the stages of acute and recovery periods (up to one year after the stroke). Neurological status was assessed using the Bartel scale, the modified Rankine scale, and the NIHSS scale. The quality of life was analyzed using the SF-36 questionnaire both in the acute period and after undergoing rehabilitation treatment.

Results: After passing through the sanatorium stage of treatment, patients showed positive dynamics in all components characterizing the quality of life, including the emotional and personal sphere, especially pronounced in the first three months after the stroke. Regular implementation of an individual rehabilitation program (IPR) on an outpatient basis contributed to a marked improvement in neurological status, an increase in SF-36 scores, and the formation of an adaptive attitude to the disease throughout the year.

Conclusion: During the first year after suffering a mild and moderate ischemic stroke, there was a recovery in self-care skills, functional independence, as well as an improvement in both physical and psycho-emotional state according to the SF-36 questionnaire. Regression of focal neurological symptoms was also recorded.

Key words: ischemic stroke, quality of life, neurorehabilitation.

Introduction: Ischemic stroke (IS) remains one of the most urgent and socially significant medical problems, which is associated with its high prevalence, significant indicators of temporary disability, and leading positions in the structure of primary disability [1-4]. According to the National Registry for the Chelyabinsk Region, the incidence of stroke in 2014 and 2015 was 3.9 cases per 1,000 population [5]. It is expected that the number of patients with disability due to AI will increase, given the increased survival rate in the presence of severe neurological disorders [6, 7]. In this regard, the consequences of stroke are becoming increasingly important for the healthcare system and require attention from specialists and researchers [8-10]. Disability after a stroke has a significant impact on the patient's quality of life, affecting a wide range of aspects – from professional realization to family interaction and social adaptation [11-13]. In recent years, interest in the study of

quality of life as an integral indicator of health status and treatment effectiveness has increased significantly [14, 15]. The implementation of effective neuro-rehabilitation measures aimed at improving the quality of life of patients, as well as the development of valid methods for its assessment, are becoming particularly relevant in clinical practice.

Modern therapeutic approaches to rehabilitation after ischemic stroke make it possible to achieve partial adaptation to the existing neurological deficit [8, 16, 17], however, the early recovery period is still poorly understood and requires further scientific analysis [2, 18, 19].

After discharge from the hospital, patients with AI are subject to follow-up by a neurologist at the polyclinic. At this stage, it is important not only to prevent stroke recurrence, but also to actively restore lost functions (motor, speech, etc.), which is directly related to the prospects for successful rehabilitation [7]. According to a meta-analysis [20, 21], the continuation of the rehabilitation process for a year after a stroke helps to reduce the risk of functional deterioration and increase the level of daily activity. Despite this, there is still insufficient data on the evidence-based effectiveness of individual methods of rehabilitation therapy [9, 22].

The purpose of the study: To evaluate the quality of life of patients in the recovery period after hemispheric ischemic stroke as an integral indicator of the effectiveness of comprehensive rehabilitation.

Materials and methods: The study was conducted on the basis of the neurological department of the Bukhara branch of the Republican Scientific Center for Emergency Medical Care (RNCEMP). The follow-up included 123 patients (64 men and 59 women) aged 40 to 80 years who were in the acute (days 7-14) and recovery (3, 6 and 12 months) periods after a mild or moderate ischemic stroke caused by hypertension in the basin of the middle cerebral artery (SMA).

These time points of examination were chosen because by this time, most patients had a stabilization of their condition and a regression of symptoms of cerebral edema. The average age of the participants was 56.7 ± 8.1 years.

The criteria for inclusion in the study were: – the presence of a verified ischemic stroke within 2-14 days from the onset of the disease;

– unilateral motor disorders (hemiparesis);

– NIHSS scores – up to 13;

– motor deficit index – up to 5 points;

– <3 points on the Modified Rankine scale (mRS).

Exclusion criteria included:

– transient ischemic attacks (TIA);

– hemorrhagic strokes;

– a history of repeated strokes;

– severe cognitive disorders before stroke (including dementia);

– severe somatic pathology in the decompensation stage;

– aphasia, which makes it difficult to communicate productively and fill out questionnaires correctly.

Neurological status was assessed on the NIHSS scale (1989), and the degree of functional impairment was assessed on the modified Rankin scale. (1957) [4, 23, 24]. The quality of life was determined using the SF-36 universal questionnaire and the Bartel scale [23, 24]. The choice of these techniques was due to their wide applicability, validity,

sensitivity, and ease of use, allowing for assessment in patients with varying degrees of severity of the condition [2, 13, 14].

The selection of patients for further treatment was carried out by clinical expert commissions of medical institutions in accordance with the decree of the Governor of the Chelyabinsk region. In the vast majority of cases, patients were referred for sanatorium treatment after the end of the acute period of AI — no earlier than 21 days after the onset of the disease [8, 10, 11], while the average referral period was 21.3 ± 0.82 days. Those patients who were not sent to the sanatorium for non-medical reasons received rehabilitation treatment on an outpatient basis.

Results: In outpatient settings, an individual rehabilitation program was developed for each patient to correct motor disorders, taking into account the degree of motor disorders and muscle tone in paralyzed limbs. The program included individual and group lessons with an instructor, the frequency and duration of which were regulated by the attending physician depending on the patient's condition.

According to the results of discharge from the hospital and the features of subsequent rehabilitation, the patients were divided into four groups:

Group 1 — patients who underwent sanatorium rehabilitation and continued performing CPR on an outpatient basis;

Group 2 — patients who underwent sanatorium rehabilitation, but did not perform IPR on an outpatient basis;

Group 3 — patients who did not undergo sanatorium rehabilitation, but followed the IPR during the outpatient period;

Group 4 — patients who did not undergo sanatorium rehabilitation and did not comply with the IPR after discharge.

The distribution of participants by age is shown in table 1.

table 1.

Age distribution of patients stratified by rehabilitation in the health retreat and implementation of an personalized rehabilitation program

Age (years)	**group 1 (n=35)**		**group 2(n=28)**		**group 3(n=33)**		**group 4(n=27)**		**Total (n=123)**	
	n	%	n	%	n	%	n	%	n	%
18-44	9	7.3	5	4.19	9	7.3	7	5.7	30	4,4
45-59	12	9.8	12	9.8	10	8.1	10	8.1	44	5,8
60-74	1	8.1	8	6.5	8	6.5	8	6.5	34	7,6
74<	4	3.3	3	2.4	6	4.9	2	1.6	15	2,2

An intergroup analysis performed using variance analysis and the Tukey correction showed that at the stage of the first examination (in the acute period of the disease), the

groups were comparable in terms of gender, age, severity of stroke, level of functional independence and quality of life indicators.

Recovery dynamics: 3 months after the stroke, the greatest improvements in the ability to self—care were recorded in patients undergoing sanatorium treatment (groups 1 and 2), while a statistically significant advantage on the Bartel scale was recorded in patients of group 1 - 100 points (range 85-100), in group 2 — 95 (90-100), p = 0.000.

However, after 6 months, the best results were achieved in patients undergoing IPR (groups 1 and 3): 100 points on the Bartel scale in both groups. At the same time, in groups 2 and 4, the average values were 95 (90-100) and 90 (85-100) points, respectively (p = 0.000).

After 12 months, the lowest recovery rates were recorded in group 4 — 90 (85-100) points, despite the fact that this group also showed a significant improvement compared to the previous stages of the examination (p = 0.001). By the end of the year, patients in groups 1 and 3 regained full independence in self-care, whose indicators significantly exceeded the values in groups 2 and 4 (p = 0.000).

Thus, the inclusion of IPR in the rehabilitation process by the 6th month after a stroke has a significant positive effect on recovery, reaching its maximum effect by the end of the first year.

In the intra-group comparison, statistically significant positive dynamics of indicators were observed at all stages of follow-up (3, 6, and 12 months) (p = 0.001), with the exception of group 2, in which such improvements were absent at a later stage.

Functional independence: According to the modified Rankine scale, one year after the stroke, the majority of patients became independent or minimally dependent on outside help, which is mainly explained by the mild to moderate severity of the stroke. However, the pace and degree of recovery differed between the groups.

The analysis of the degree of dependence revealed significant differences:

After 3 months — between groups 1 and 2-4 (p = 0.007);

After 6 months — between groups 1 and 2, 4, and 3 and 4;

After 12 months, the greatest independence was observed in groups 1 and 3 compared to groups 2 and 4.

During the year, all groups showed significant regression of focal neurological symptoms (p=0.001), with the exception of the motor component in group 2 between 3 and 6 months. An intergroup analysis after 3 months revealed statistically significant differences in the severity of motor disorders (paralysis and paresis): patients who underwent sanatorium treatment (groups 1 and 2) had the best scores — medians of 1 (0-3) and 1 (0-2) points, respectively, which was significantly better compared with groups 3 and 4, where the indicators were 2 (1-3) and 2 (1-4) points (p = 0.000).

After 6 months, more pronounced paresis persisted only in groups 2 and 4 compared to the others. However, a year later, the best indicators of motor function were observed in group 1, significantly exceeding groups 2 and 4. At the same time, motor parameters in groups 2 and 3 were significantly lower than in group 4 (p = 0.003).

According to the total neurological score after 3 months, group 4 showed statistically worse results compared to the rest (p = 0.03). After 6 and 12 months, patients in groups 1 and 3 had significantly lower severity of neurological deficits compared with groups 2 and 4 (p = 0.000), while focal symptoms dominated in patients in group 4 (p = 0.000). Thus, in the first 3 months, the greatest decrease in the severity of focal disorders was observed in patients who

underwent sanatorium treatment, while further improvement in neurological status depended on compliance with an individual rehabilitation program.

Interestingly, patients who underwent sanatorium treatment but did not perform CPR maintained their achieved motor function throughout the year, but did not achieve high results in terms of total neurological score after 6 and 12 months.

The analysis of intergroup factors revealed a significant relationship ($p = 0.002$) between the combined positive effect of sanatorium rehabilitation and compliance with IPRA on the level of self-care after 6 and 12 months, as well as on the severity of neurological symptoms according to the total score after 12 months.

When assessing the quality of life on the SF-36 scale, positive dynamics was noted throughout the year in terms of subscales of physical activity (FF) and role-based physical functioning (RFF) in all groups, however, the pace and degree of functional recovery varied. In the first 3 months, the best FF and RFF scores were recorded in groups 1 and 2 who underwent sanatorium rehabilitation, with a significant increase in scores to 75 (45-90) and 70 (45-85) for FF and 75 (50-100) for RFF, respectively ($p = 0.000$ and $p = 0.003$).

After 6 months and a year, group 1 patients significantly assessed their physical abilities higher than patients from other groups ($p = 0.000$). Patients in groups 2 and 3 showed a similar level of physical activity after 6 months — 75 points on both subscales. At the same time, by 12 months in group 3, significantly better FF and RFR scores were obtained (up to 80 (65-95) and 100 (75-100) points, respectively), compared with group 2, where patients did not adhere to IPRF.

Despite a statistically significant improvement in physical activity indicators within group 4 in the first 6 months ($p = 0.004$), these patients were unable to appreciate their physical abilities a year later and, in an intergroup comparison, had significantly lower FF and RF scores compared with patients in groups 1, 2 and 3 ($p = 0.000$). At the same time, a statistically significant decrease in pain was noted in all groups during the year ($p = 0.001$). There were no intergroup differences in the combat component ($p = 0.329$).

According to the general health subscale, a significant improvement in the condition of patients in groups 1 and 3 was recorded at all stages of follow-up ($p = 0.000$). In group 2, improvement was noted after 3 months ($p = 0.000$), but by the end of the year there was a statistically significant deterioration in overall health compared with the results of the first 6 months ($p = 0.001$). In group 4, the dynamics of overall health was minimal, despite a statistically significant increase in indicators in the first 6 months compared with the baseline in the hospital ($p = 0.002$).

In the intergroup analysis, after 3 months, patients in the first two groups who underwent sanatorium follow-up showed significantly higher health scores ($p=0.000$) compared with groups 3 and 4. After 6 months, patients in group 1 received the highest overall health score ($p=0.000$), while respondents from groups 2 and 3 showed statistically significantly lower overall health scores ($p=0.001$), and the lowest scores were in group 4 patients. After 12 months, the best results were achieved by patients in groups 1 and 3 who followed an individual rehabilitation program, in contrast to groups 2 and 4 ($p=0.000$).

The "psychological component of health" indicator, which includes vitality, social functioning, role-based emotional functioning, and mental health, was also analyzed. According to the viability subscale (G), there was a significant positive trend ($p=0.000$) in groups 1 and 3 at all stages of the examination (3, 6, 12 months). In groups 2 and 4,

statistically significant improvement (p=0.000 and p=0.025, respectively) was noted only 3 months after the stroke. An intergroup analysis after 3 months showed higher viability scores (p=0.002) in patients of the first two groups compared with groups 3 and 4. After 6 months, patients in group 1 (p=0.000) felt the most energetic, while respondents from groups 2 and 3 had statistically significantly lower scores (p<0.05), and the worst results were recorded in group 4 (p=0.000). One year later, the highest viability rates were in patients in group 1 (p=0.000), slightly lower in group 3 (p=0.013), and groups 2 and 4 showed significantly lower viability (p=0.000).

Thus, sanatorium rehabilitation has a significant positive effect in the first three months, however, if you refuse to independently implement recommendations on physical activity and therapy, by the end of the first year, the results achieved are significantly reduced.

Social adaptation plays an important role in restoring a habitual lifestyle, expanding the patient's ability to function independently in everyday life and return to professional activity. At the stage of inpatient treatment, the social activity of all patients was reduced to 62.5 points. A significant improvement in the subscale of social functioning (SF) — up to 87.5 points — was recorded in the first 3 months in patients of the first three groups undergoing rehabilitation in a sanatorium or outpatient, compared with group 4 who refused to perform CPR (p=0.000).

Six months later, the highest indicators of social functioning were observed in groups 1 and 3 (p=0.001), while group 2 showed a slight decrease and their scores were statistically lower (p=0.000) compared with groups 1 and 3. By the end of the year, patients who followed rehabilitation programs at the outpatient stage (groups 1 and 3), significantly differed in the level of social activity from patients who refused independent study (p=0.000). At the same time, groups 2 and 4 also showed a fairly high level of social activity after a year, which is probably due to the low severity of focal symptoms that do not restrict communication.

According to the subscale of role-based emotional functioning (REF), after 3 months, significantly lower indicators were found in group 4 compared with group 1 (p=0.000). After 6 months, the emotional status of group 1 patients was the most stable, with the maximum statistically significant dynamics (p=0.000) reaching 100 points (66.6–100). It is important to note that group 1 patients maintained high ratings of their emotional state throughout the year, which did not interfere with their daily activities. Group 2 patients also showed positive dynamics in the first 3 months after sanatorium treatment, but their indicators worsened during the year.

In the group of patients who performed only an individual rehabilitation program (group 3), there was a significant positive trend (p=0.004) in reducing emotional problems that limit daily activities. By the end of the year, their results were comparable to those of patients who had undergone sanatorium rehabilitation (p=0.426). The recovery of the psychological health index (PS) occurred in a similar way. In groups 2.1 and 2.3, there was a significant (p=0.000) improvement in results throughout the year in all survey periods, while by the end of the year there were no differences in the PD index (p=0.133). Patients in group 2.2 showed significant improvement (p=0.001) only after 3 months, while in group 2.4, positive dynamics were recorded at 3 and 6 months. An intergroup analysis after 3 months revealed that the indicators of the 2.4 group were significantly lower (p=0.001) than in the

other groups. However, after one year, patients in groups 2.1 and 2.3 had significantly (p=0.000) higher levels of positive emotions compared with groups 2.2 and 2.4.

Comprehensive rehabilitation programs at the sanatorium have a more pronounced positive effect on restoring self-care skills in the first three months after a stroke compared with outpatient rehabilitation [1, 7, 8]. In our study, sanatorium follow-up treatment of patients with stroke in the middle cerebral artery provided an increase in self-care by 10%, independence from outside help by 25%, an increase in strength in paralyzed limbs by 50%, as well as an improvement in psychological condition and social adaptation after 3 months compared with outpatient rehabilitation.

The main principles of neurorehabilitation, as a key stage of recovery after a stroke, are the early start of rehabilitation measures, the systematic and duration of treatment, a multidisciplinary approach, as well as the active participation of the patient and his relatives. [2, 8, 16, 18]. Our data show that sanatorium rehabilitation after inpatient treatment, followed by an individual rehabilitation program at home for a year, contributes to the full recovery of basic daily activities on the Bartel scale, ensures functional independence on the Rankin scale, and reduces focal symptoms on the NIHSS scale by 50% compared with patients who do not follow the recommendations.

In addition, in the groups following the recommendations of a neurologist and a rehabilitologist for mild or moderately severe stroke, there was an increase in the "quality of life" indicators according to the SF-36 questionnaire by 25-50% in the first 12 months after the stroke. We have also shown that when it is impossible to undergo sanatorium treatment, individual physical programs at home, independently or with the support of relatives and physical therapy instructors have a significant effect in restoring functions and improving the quality of life.

Satisfactory recovery of motor functions and reduced dependence in patients who do not follow rehabilitation measures can be explained by neuroplasticity mechanisms — activation of preserved and previously unused areas of the affected hemisphere, as well as compensatory activity of the intact hemisphere and neurons of the periinfarction zone [9, 13].

It is important to note that the criteria of "quality of life" are recognized as an important part of the comprehensive assessment of new methods of diagnosis, treatment and prevention in medicine [3, 11, 23], including the development of rehabilitation programs. Efforts should be directed not only at preventing disability, but also at increasing life satisfaction for stroke patients. In this regard, the use of the SF-36 questionnaire as an integral indicator of the quality of life in patients after stroke is advisable and effective for monitoring the dynamics of recovery, which is of practical importance for the work of neurologists and rehabilitologists.

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