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Original Research

ASSESSING MOTOR REHABILITATION OF POST-STROKE PATIENTS USING THE MOTOR ASSESSMENT SCALE

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ABSTRACT: To evaluate the motor function recovery in post-stroke patients using the motor assessment scale (MAS). A prospective, interventional, cross-sectional descriptive study without a control group, with assessments before and after treatment. The study was conducted on 92 post-stroke patients who received examination and treatment at the Rehabilitation Department, Emergency Cardiology Intervention Department, Neurology Department, and Traditional Medicine Department of Thong Nhat Hospital from May 2023 to May 2024. Motor function recovery was evaluated using the MAS scale, which includes 8 main activities: lying, sitting, standing, walking, and upper limb and hand movements. Motor function improved significantly after treatment, with an average increase of 5.58 ± 0.83 points ($p<0.001$). The position-shifting group showed greater improvement compared to the upper limb and hand movement group. The position-shifting score increased by 4.17 ± 0.5 points, while upper limb and hand activity scores increased by 0.86 ± 0.06 points. Activities that showed marked improvement included transitioning from supine to side-lying, from lying to sitting, achieving sitting balance, and standing up from a seated position. Upper limb and hand function requires more time to achieve full rehabilitation.

Keywords: *Motor Assessment Scale, rehabilitation, upper limb movement, stroke*

1. INTRODUCTION

Movement is a basic human activity. In stroke, the rate of patients with motor impairments is highest, reaching 92.96%, of which mild and moderate impairments account for 68.42%; severe impairments account for 27.69% [1]; 2/3 of patients are partially or completely dependent in activities of daily living; 50% cannot recover hand function . This will greatly affect the quality of life of post-stroke patients. Motor rehabilitation plays a very important role for post-stroke patients. To evaluate the effectiveness of motor function rehabilitation in patients, the MAS scale is a commonly applied scale today because this scale covers most basic human motor functions, including activities from changing lying, sitting, standing, walking positions to functional activities of upper limbs and hands. The scale has 8 basic criteria, is easy to practice, and gives very promising results. Through the MAS scale, we can easily quantify the degree of motor impairment as well as the results of rehabilitation treatment in post-stroke patients .

At Thong Nhat Hospital, admission of stroke patients has been increasing in recent years. However, there are only a few studies evaluating the effectiveness of the MAS scale applied to patients exercising after stroke. Therefore, we conducted this study with the following objectives:

+ Survey some clinical characteristics of stroke patients treated at Thong Nhat Hospital.

+ Evaluate motor function rehabilitation outcomes in post-stroke patients using the MAS scale.

2. SUBJECT AND STUDY METHOD

2.1. Study subjects

Patients diagnosed with stroke confirmed by clinical and imaging diagnosis (CT scan, MRI), treated at the Rehabilitation Department, Emergency Cardiovascular Intervention Department, Neurology Department, and Traditional Medicine Department at Thong Nhat Hospital from May 2023 to May 2024.

2.2. Selection criteria

Inclusion criteria: Patients diagnosed with stroke under 3 months, conscious, understanding and participating in at least 1 exercise session per day for 30-45 minutes with technician support, exercising continuously for 10 days.

Exclusion criteria: Stroke patients with limiting pathology affecting motor rehabilitation such as: bone and joint diseases, joint deformity due to gout... Patients and families not participating fully in the research process.

2.3. Sampling method

Convenience sampling including all patients meeting selection criteria and having no exclusion criteria, coming for treatment during the study period and agreeing to participate.

2.4. Sample size

Since this is research conducted within a limited time frame and is exploratory in nature at a specific treatment facility, the sample size was chosen using the convenience method, including all patients meeting selection criteria and having no exclusion criteria, treated at the hospital from May 2023 to May 2024, with an expected approximately 90 patients.

2.5. Variables in study

Age: quantitative variable calculated by subtracting birth year from admission year, divided into groups: < 60 years; > 60 years.

Gender: qualitative variable with 2 values: male and female.

Disease duration: qualitative variable with 3 values: < 1 week; 1 week - 1 month; > 1-3 months.

Stroke type: qualitative variable with 2 values: cerebral infarction; brain hemorrhage.

Variables: Movement from supine to side-lying on the healthy side; Movement from lying to sitting with legs hanging by the bed; Sitting balance; Movement from sitting to standing position; Walking; Upper limb function; Hand movement; Dexterous hand activities recorded at two time points - start and end of treatment - are quantitative variables evaluated through examination and recorded in the data collection form.

Evaluation of main activity treatment results: quantitative variable including: position change movement group; upper limb and hand movement group; walking recorded at two time points - start and end of treatment.

2.6. Implementation steps

All patients coming for examination at the Rehabilitation Department, Emergency Cardiovascular Intervention Department, Neurology Department, and Traditional Medicine Department at Thong Nhat Hospital from May 2023 to May 2024.

Select patients meeting inclusion criteria and having no exclusion criteria.

Clinical examination and establish rehabilitation evaluation chart using MAS scale for each patient.

Patients undergo the same rehabilitation program including active-assisted exercises with technicians, once daily, 30-45 minutes per session. Content includes position changing exercises, balance exercises, upper and lower limb movements, strength and flexibility enhancement exercises for 10 days.

Patients are examined and motor function is re-measured using MAS scale at post-treatment time point: when patient is discharged.

2.7. Data Processing

Data were entered using Excel 2016 software and processed using SPSS 20.0 statistical software. T-test was used to compare average MAS scores of patients before and after treatment. Results are statistically significant when $p < 0.05$.

3. RESULTS

After completing the data collection process from 92 stroke patients meeting study participation criteria, we proceeded to analyze the clinical characteristics of the subject group and evaluate motor rehabilitation effectiveness using MAS scale at two time points: before and after rehabilitation intervention. The detailed analysis results are presented below.

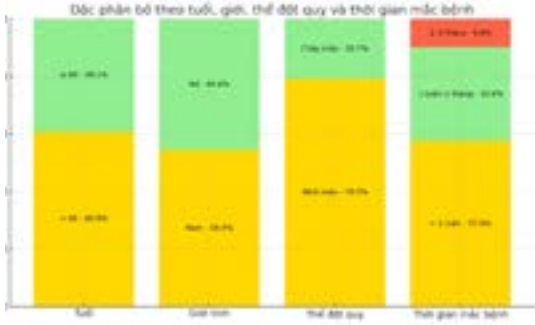

Chart 1. Characteristics distribution by age, gender, stroke type and disease duration

Average age in the study was 64.23 ± 8.19, highest age was 90, lowest age was 34, the most common age group was >60 years, accounting for 60.9%. Male incidence rate was higher than female, accounting for 54.4%. The rate of cerebral infarction patients accounted for the majority (79.3%). The most common disease duration was < 1 week, accounting for 57.6%. Table 1 shows the results of evaluating basic motor activities in post-stroke patients, indicating that all activities showed significant improvement after rehabilitation treatment, with statistically significant improvement levels ($p<0.001$).

The assessment results of basic motor activities in post-stroke patients showed that all activities had significant improvement after functional rehabilitation treatment, with a statistically significant level of improvement ($p<0.001$).

Table 1. Lower limb motor recovery results

Activity	Average score before treatment	Average score after treatment	Score difference	P
Supine → side-lying on healthy side	1.97	3.75	+1.78	<0.001
Lying → sitting with legs hanging by bed	2.78	3.85	+1.07	<0.001
Sitting balance	2.57	4.78	+2.21	<0.001
Sitting to standing	1.88	3.33	+1.45	<0.001
Walking	0.73	1.28	+0.55	<0.001

Sitting balance was the activity with the highest improvement level, with average score increasing from 2.57 to 4.78 points (+2.21 points). This shows that patients achieved autonomy in maintaining sitting balance and performing turning and working with hands more effectively.

Sitting to standing and lying to sitting activities also showed significant improvement, increasing by +1.45 points and +1.07 points respectively, reflecting improved position changing ability through treatment.

Supine to side-lying on healthy side activity increased by +1.78 points, showing that patients learned to utilize healthy limbs to support the position changing process.

Although improved, walking activity had the lowest average scores before and after treatment (0.73 → 1.28 points), reflecting that independent mobility ability still has many limitations, requiring more exercise time to achieve higher functional levels.

Table 2 shows the results of evaluating upper limb and hand activities, indicating improvement after treatment, however the improvement level was modest compared to other gross activities like position changing or balance.

Upper limb activity had an average score before treatment of 0.67, increasing to 1.91 after treatment (+1.24 points, $p < 0.001$), showing clear improvement. However, most patients still could not perform complex movements like lifting arms or pushing hands against the wall.

Hand activity increased slightly from 0.61 to 0.79 points (+0.18 points, $p < 0.001$), showing limited improvement. Many patients only stopped at simple grasping level, unable to rotate or lift objects actively.

The dexterous hand activity group specifically recorded average scores after treatment lower than before treatment scores (0.55 → 0.49 points), difference of -0.06 points, though still statistically significant ($p < 0.001$). This reflects that fine movements like picking up pens, finger opposition, hair brushing... remain major challenges in the early recovery phase.

Table 2. Upper limb motor recovery results

Activity	Average score before treatment	Average score after treatment	Score difference	P
Upper limb	0.67	1.91	1.24	<0.001
Hand	0.61	0.79	0.18	<0.001
Dexterous hand	0.55	0.49	-0.06	<0.001

Results of assessments for upper limb and hand activities showed improvement after treatment, although the level of improvement remained modest compared to other gross motor activities such as postural changes or balance.

Upper limb activities had a mean score of 0.67 before treatment, which increased to 1.91 after treatment (+1.24 points, $p < 0.001$), demonstrating significant improvement. However, the majority of patients still could not perform complex movements such as lifting arms or supporting themselves against a wall with their hands.

Hand activities increased slightly from 0.61 to 0.79 points (+0.18 points, $p < 0.001$), indicating limited improvement. Many patients only reached the level of simple grasping and were not yet able to actively rotate or lift objects.

Specifically, the group of fine hand motor activities recorded a mean score after treatment that was lower than the pre-treatment score (0.55 → 0.49 points), with a difference of -0.06 points, though this remained statistically significant ($p < 0.001$). This reflects that fine motor movements such as picking up a pen, finger opposition, combing hair, etc., remain major challenges during the early recovery phase.

All activities showed significant improvement after treatment ($p<0.001$), with the positional transfer movement group showing the greatest change (score difference of 4.17 ± 0.5); the upper limb and hand movement group showed less

Table 3. Summary of main activity evaluation results (SD)

Main activities	Before treatment	After treatment	Score difference	P
Position change movement group	9.04 ± 4.95	13.21 ± 5.45	4.17 ± 0.5	< 0.001
Upper limb and hand movement group	1.84 ± 0.39	2.70 ± 0.45	0.86 ± 0.06	
Walking	0.73 ± 1.09	1.28 ± 1.36	0.55 ± 0.27	
Total score	11.61 ± 6.43	17.19 ± 7.26	5.58 ± 0.83	

change (score difference of 0.86 ± 0.06). The total score before treatment was 11.61 ± 6.43 points; after treatment it reached 17.19 ± 7.26 points (an increase of 5.58 ± 0.83 points).

4. DISCUSSION

4.1. Study subject group characteristics

Among 92 patients, males accounted for 54.4%, females 45.6%. The majority belonged to the over-60 age group (60.9%), consistent with stroke epidemiological characteristics. Cerebral infarction rate was predominant (79.3%) compared to brain hemorrhage (20.7%), similar to previous studies , , .

Notably, 57.6% of patients received intervention within 1 week of onset, showing that stroke reception and management work at Thong Nhat Hospital was performed timely. Early treatment helps significantly improve motor rehabilitation prognosis.

4.2. Treatment outcome evaluation

Evaluating the results of each sub-item activity, we found that the position change movement group (rolling, lying to sitting, sitting to standing) had more improvement, with total scores achieved higher than other movement groups (walking, upper limb and hand activities, especially dexterous hand activities).

Total score of the position change movement group increased from 9.04 ± 4.95 points before treatment to 13.21 ± 5.45 points after treatment. The before-after treatment difference reached 4.17 ± 0.5 points. While the total score of the upper limb and hand movement group (including dexterous hand movements) only reached 1.84 ± 0.39 before treatment and 2.70 ± 0.45 points after treatment. The before-after treatment difference was only 0.86 ± 0.06 points. This difference is statistically significant with $p<0.001$.

Movements requiring support from the healthy side (healthy hand or leg) or technician support all decreased significantly after treatment. The number of patients able to actively perform activities increased markedly after treatment. The number of patients with improved upper limb and hand activity details was not many, some difficult movements (standing with hands against wall while turning, finger opposition, holding pen to make dots on paper, scooping liquid with spoon into mouth...) the number of patients able to perform was still very few, some movements still could not be performed (holding comb to brush hair at back of head). Thus, through evaluation scoring, it can be seen that the overall result is promising, especially in the position change movement group (lying, sitting, standing). However, the results of upper limb and hand activities still have limitations. This is consistent with the body's recovery rules after stroke, that is, gross activities, mass activities, lower limb activities usually recover earlier and faster; fine activities, upper limb activities usually recover later and slower[2], [3], [4], [6], [8], [10].

The average total score, although improved compared to before treatment, was still quite low compared to the desired score (maximum: 48 points). This result is because most patients could not yet perform difficult sub-items (with high scores), especially upper limb and hand activities which were still difficult and limited. Additionally, treatment and exercise time at the hospital was not long (10-day treatment period) while the recovery process is a long journey, requiring much more time, especially for

recovering upper limb and hand activities, particularly fine, dexterous activities. This is quite consistent with many studies by other authors[2], [3], [4], [6], [8], [10].

5. CONCLUSION

The study shows that applying a short-term motor rehabilitation program combined with MAS scale in clinical evaluation helps record significant improvements in post-stroke patients' motor ability, especially in position changing and balance maintaining activities.

However, fine movements like upper limb and hand use still have many limitations, showing that the recovery process in this functional group usually progresses slowly and requires longer intervention time. This reflects the physiological characteristics of recovery after central nervous system damage, where gross activities recover earlier than fine activities.

Using the MAS scale in treatment monitoring helps evaluate recovery progress visually and comprehensively, thereby supporting the development of more appropriate exercise programs for each disease stage.

Based on research results, it is necessary to continue implementing rehabilitation programs with clear structure, sufficient duration, and integration of additional supportive methods to maximally improve motor function for post-stroke patients.

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