Original

A Survey on Rehabilitation Assessment and Interventions to Treat Impairments of the Upper Extremity after Stroke in Japan

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Abstract

【Background】 Rehabilitation interventions run the risk of limiting meaningful functional recovery if they fail to consider the therapeutic efficacy of the approaches employed.

Goal: Occupational therapists who work for convalescent rehabilitation wards were surveyed in order to determine the actual assessments and interventions they provided, the treatment theories on which they based, the treatments in which they were interested, and the treatments that they considered effective for addressing upper extremity impairments in stroke patients.

【Method】 The subjects consisted of 102 occupational therapists. Questionnaire survey method. Sample items that evaluated assessment methods (57 items) and interventions (78 items) were provided, and the subjects were asked to choose the items they implemented in clinical practice.

【Result】 Responses were obtained from 23 institutions (response rate: 22.5%). The mean hospitalization period in recovery wards was 83.8 ± 16.0 days. Each facility provided OT to an average of 10.8 ± 8.6 patients per day, with an average of 21.9 ± 19.4 total sessions per day.

The Evaluation contents: The Grasp functional improvement was evaluated such as Power grip, Active Range of Motion, Brunnstrom recovery stage (BRS), Pinch, Simple test for evaluating hand function (STEF) and functional Independence Measure (FIM).

The balance ability were evaluated such as sitting and standing, shoulder range, weight shift and mobility ability. The upper extremity ability were evaluated such as BRS, FIM and Barthel Index (BI), Placing. The upper limb function recovery were evaluated such as Static and Dynamic alignment, BRS and evaluation of shoulder joint. The Upper limb dysfunction and functional prognosis was evaluated by BRS.

The rehabilitation program contents for upper extremity: The intervention items for impairments of the upper extremity were various. The arm sling was used for upper extremity function at all the institutions. Furthermore, even though the efficacy of constraint-induced movement therapy (CIMT) and repetitive facilitative exercises have been demonstrated, a few institutions conducted these therapies.

【Conclusion】 The traditional evaluation items, such as BRS, balance and limb posture evaluation were implemented, but few of the new evaluation tools. The CIMT was limited to mild cases based on the eligibility criteria. Repetitive facilitative exercise may have been difficult to perform because the therapists have to receive special training. The results of the present study show that evidence-based evaluations and training content had been reported, but the rate of actual implementation is low. Moreover, the amount of training and duration are consistent to a certain extent, the number of repetitions remains insufficient.

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—Key words—

stroke, OT intervention, upper extremity functional

Introduction

Treating upper limb impairment following a stroke is an important topic in the field of occupational therapy (OT). However, rehabilitation programs for upper limb impairment lack well-defined treatment guidelines, and the specific details and approaches employed are often left to the judgement of individual occupational and physical therapists. Therapists may decide on a treatment technique based on their personal subjective impression, or because they feel proficient in the technique. Selection and adaptation criteria for therapeutic approaches must also take into account patient symptom severity and time since stroke onset. Rehabilitation interventions run the risk of limiting meaningful functional recovery if they fail to consider the therapeutic efficacy of the approaches employed.

Based on the assumption that the frequency of upper limb use (i.e., exercise frequency and volume) guides recovery from upper limb paralysis, previous research has called for rehabilitation interventions to encourage behavioral changes by which patients can correct the "learned non-use" that occurs after a stroke[1]. Combination therapies are also sometimes performed: these can combine rehabilitation therapy with transcranial magnetic stimulation (TMS) -based approaches to enhance interhemispheric inhibition, or with repetitive magnetic stimulation (RMS) -based facilitation therapy to treat the damaged hemisphere[2]. However, despite ongoing improvements in prognostic accuracy provided by diagnostic imaging and other technologies, recovery mechanisms following stroke remain unclear.

Early research on neuroplasticity evoked by rehabilitation therapy used experimental animals, specifically monkeys applications of neurorehabilitation therapy would later extend to stroke patients[3]. Several specific interventions with reported therapeutic efficacy target patients in the maintenance period, after acute stroke recovery. However, neurorehabilitation based interventions have uncertain therapeutic efficacy during the period when most post-stroke recovery is expected (i.e., between 3 and 6 months after stroke onset).

OT interventions with evidence supporting therapeutic efficacy for stroke include neurophysiological approaches, neurodevelopmental therapy, electromyographic biofeedback, functional electrical stimulation, and motor learning approaches. Practitioners increasingly use not only traditional OT approaches, but also incorporate electrophysiological techniques, as well as new approaches adapted from kinesiology and psychology. Novel therapies also include neurorehabilitation-based approaches, e.g., (CIMT) and robotics[4], demonstrating neuroscience's increasing prominence in clinical rehabilitation. Stroke guideline (AHA/ASA Guideline, 2016)[2] recommends increasing exercise frequency and volume during the recovery period to encourage effective recovery from functional disability. Strength training through repetitive practice may represent one approach to improving upper and lower function after stroke.

It is reportedly important for occupational therapists to perform interventions that target activities of daily living (ADL)[5]. Seeking to create a taxonomy of physical therapy programs, one American report classified intervention techniques into a few major approaches (i.e., neuromuscular, cardiopulmonary, cognitive/perceptual/sensory, and musculoskeletal interventions), all with the stipulated outcome of functional activities (i.e., the acquisition of basic motor skills)[6]. Nevertheless, occupational therapists often use combination approaches, mixing several intervention modalities. Roughly 75% of occupational therapists include training for independent ADL[7]; interventions for some patients focus instead on functional impairment (Bode, 2004)[8]. Such interventions often comprise both top-down and bottom-up approaches, or else one instead of the other, depending on the patient's condition.

The selection criteria for treatment methods are unclear, however, and the decision of which methods to perform in practice is left to the therapist. The scope of therapeutic interventions performed by occupational therapists includes improving not only physical function and self-care ability, but also social participation and patient satisfaction. No uniform, one-size-fits-all intervention exists, because occupational therapists must select a treatment course while taking into account individual patient characteristics. However, patients will be inhibited from active participation in their own treatment so long as interventions for stroke rehabilitation remain a "black box"[6]. Thus, treatment modalities and their constituent evaluation methods must be clarified and the results shown to patients, even for OT programs that emphasize individualized treatment.

The first goal of the study was to determine what kind of assessments and interventions occupational therapists perform to treat impairments of the upper extremity in patients with post-stroke hemiplegia. The second goal of the study was to develop the program of upper extremity physical exercises for stroke patients, and to provide treatment recommendations with them. In this study, a survey was conducted with a self-administered questionnaire. Occupational therapists who work for convalescent rehabilitation wards were surveyed in order to determine the actual assessments and interventions they provided, the treatment theories on which they based, the treatments in which they were interested, and the treatments that they considered effective for addressing upper extremity impairments in stroke patients.

Method

1. Subjects

The subjects consisted of 102 occupational therapists from 102 institutions located in Tokyo or Kanagawa that belong to the Convalescent Rehabilitation Ward Association.

2. Questionnaire survey method

This survey was conducted using a self-administered questionnaire. We mailed the instructions, a summary of the study, and the questionnaire to the occupational therapists. To address ethical considerations and preserve participant anonymity, the survey was carried out using unsigned questionnaires without any identifying personal or institutional information. Participation in this study was entirely voluntary. The study was explained to the subjects in writing. The participants were asked to indicate their consent to participate in this study by returning the questionnaire.

This study was conducted after obtaining approval from the research ethic review board of Kanagawa University of Human Services (approval notification # 25-56).

Based on previous studies, we prepared a questionnaire with items to determine the methods of assessment, interventional procedures, institutional protocols, and actual rehabilitation practices utilized by the therapists. Sample items that evaluated assessment methods (57 items) and interventions (78 items) were provided, and the subjects were asked to choose the items they implemented in clinical practice.

3. Preparation of the questionnaire

1) Document retrieval

A literature search of the medical research database "Igaku Chuo Zasshi" was performed to retrieve documents with keywords including stroke, rehabilitation, and upper extremity function.

As a result, 172 documents were extracted, excluding conference minutes. Out of the documents that were identified through this search, the documents that mentioned specific assessment and intervention methods were chosen to develop the questionnaire items.

A total of 57 assessment items were incorporated into the survey; these items evaluated hand and finger grasp function (assessment of dysfunction, assessment of functional limitation, assessment of activity limitation), assessment of posture, balance and pushing, improvement of supporting and reaching function of the upper extremity (evaluation of post-stroke hemiplegia including the supporting and reaching functions of the upper extremity, global assessment scale, scale of dysfunction, assessment of support function, and assessment of reaching function), improvement of upper extremity function (evaluation of upper extremity function), impairment of the upper extremity and prognosis of function (assessment of recovery of upper extremity paralysis, assessment of dysfunction, quantitative assessment of the upper extremity before and after rehabilitation intervention), and assessments of activities of daily living (ADL).

The questionnaire contained 78 items about therapeutic interventions, and they assessed intervention methods, theoretical models, as well as approaches to improve upper extremity function, support, and reaching functions of the upper extremity, hand and finger grasp functions, and upper extremity function.

2) Institutional Overview

We also investigated the institutional protocols, actual rehabilitation practices, and methods of assessment and intervention with questions that allowed open-ended responses.

3) Assessment Measures

Please tell us about the methods you use for the evaluation of post-stroke upper extremity function, such as assessments, batteries, and questionnaires.

4) Therapeutic approach

Do you have a framework, view, model, and concept for the treatment of stroke? What kinds of theories, models, concepts, and techniques are used for the treatment of stroke?

5) Interested intervention

Please tell us about the procedures and therapeutic approaches you are interested in to treat post-stroke upper extremity impairments.

Results

Responses were obtained from 23 institutions (response rate: 22.5%). Reported below is an overview of the participating facilities and of the implementation status of their rehabilitation programs.

1. Summary of the rehabilitation ward

Facilities contained an average of 78.1 ± 44.2 beds on kaifukuki rehabilitation wards, 74.4 ± 74.6 beds on long-term-care wards, and 64.2 ± 44.0 general beds. The mean hospitalization period in kaifukuki rehabilitation was 83.8 ± 16.0 days.

Facilities satisfied the following institutional criteria, categorized by disease group: Cardiovascular Disease Rehabilitation Facility — Class I, 2 institutions (Class II, 0 institutions); Cerebrovascular Disease Rehabilitation Facility — Class I, 19 institutions (Class II, 1 institution); Motor Rehabilitation Facility — Class I, 18 institutions (Class II, 1 institution); and Respiratory Rehabilitation Institution — Class I, 7 institutions (Class II, 0 institutions).

2. Rehabilitation Implementation Status

Each facility provided OT to an average of 10.8 ± 8.6 patients per day, with an average of 21.9 ± 19.4 total sessions per day. The breakdown of responding facilities in terms of sessions performed per day is as follows: 1 session per day, 8.75 ± 12.4% of institutions; 2 sessions, 30.7 ± 27.4%; 3 sessions, 55.0 ± 32.3%; 4 sessions, 2.95 ± 5.8%; 5 sessions, 0.5 ± 2.2%; 6 sessions, 1.5 ± 6.7%; 9 sessions, 0.5 ± 2.2%.

3. Evaluation (Table 1, 2)

1) Grasping Function

Common assessment measures included grip strength, active exercise performance, Brunnstrom recovery stage (BRS), pinch testing, STEF (Simple Test for Evaluating Hand Function) score, and FIM (Functional Independence Measure) score.

2) Balance

Common assessment measures were sitting and standing balance testing, shoulder range-of-motion, weight transfer ability, and mobility capacity, accounting for 91–100% of responses.

3) Upper extremity Reaching / Movement

Results were similar to Grasping Function, above; the BRS was performed especially often. FIM score and Barthel index (BI) were often used to assess ADL; placing and balance tests were often performed to measure postural control.

4) Upper Limb Functional Recovery

The BRS was often performed to assess static and dynamic alignment.

5) Upper Limb Functional Impairment and Prognosis

The BRS was often performed, with other measures used infrequently.

4. Rehabilitation program contents (Table 3)

1) Intervention

Approaches performed included task-oriented exercises, repetitive facilitative exercises (RFE), Integrated Volitional-control Electrical Stimulation (IVES), and reaching exercises.

2) Upper Limb Stability and Reaching Ability Exercises

Exercises often performed included arm sling, voluntary movement exercises, balance training, and resis-

Table 1 Evaluation contents

Grasp functional improvement					
a. Evaluation of dysfunctions	N	%	b. Evaluation of impairments	N	%
1 power grip	23	100	1 STEF	23	100
2 Active ROM	21	91	2 MAL	7	30
3 BRS, pinch	20	87	3 MFT	4	17
4 Modifed Ashworth scale	6	26	4 WMFT, ARAT	1	4
5 FMA	5	22			
6 SIAS	2	9			
7 SARA	1	4	c. Evaluation of disabilities	N	%
8 Motricity index	0	0	1 FIM	22	96
			2 FAI	1	4
Evaluation of balance, pushing	N	%			
1 control of balance in sitting, standing	23	100			
2 rang of motion on shoulder, weight shift	22	96			
3 mobility ability	21	91			
4 evaluation of pushing	16	70			

ARAT (action research arm test), BRS (Brunnstrom recovery stage), FAI (Frenchay activities index), FIM (functional Independence Measure), FMA (Fugl-Meyer Assessment), MAL (Motor Activity Log), MFT (Manual Function Test), SIAS (Stroke Impairment Assessment Set), SARA (scale for the assessment and rating of ataxia), SIAS (Stroke Impairment Assessment Set), STEF (Simple Test for Evaluating Hand Function), WMFT (Wolf Motor Function Test).

Table 2 Evaluation contents for upper extremity

Upper extremity reaching and movement					
a. Clinical Evaluation of Stroke	N	%	b. Scale of comprehensive evaluation	N	%
1 BRS	19	83	1 COPM	7	30
2 MAS	4	17	2 FMA, NIHSS	3	13
3 FMA	3	13	3 MOHO	2	9
4 MFT	2	9	4 SIAS	1	4
5 SIAS, Japan Stroke Scale	1	4	5 Japan Stroke Scale	0	0
c. Scale of impairment	N	%	d. Evaluation of supprting posture	N	%
1 BRS	17	74	1 Placing	19	83
2 FMA	3	13	2 balance test	15	65
3 MAS	2	9	3 machine evaluation	3	13
4 CMSA	0	0			
e. Index of ADL	N	%	f. Evaluation of reaching	N	%
1 FIM	20	87	1 Protraction	5	22
2 Barthel Index	14	61	2 FRT in sitting	4	17
Upper limb function recovery					
a. Evaluation of upper limb function	N	%			
1 Static･Dynamic alignment, BRS	20	87			
2 Sholder evaluation	13	57			
3 MFT	1	4			
Upper limb dysfunction and functional prognosis					
a. Evaluation of upper limb function recovery	N	%	b. Upper extremity function test	N	%
1 BRS	21	91	1 MAL	6	26
			2 WMFT	2	9
c. Evaluation of impairments	N	%	3 ARAT	1	4
1 FMA	5	22	4 Box and Block test	0	0

ARAT (action research arm test), BRS (Brunnstrom recovery stage), CMSA (Chedoke-McMaster Stroke Assessment), COPM (Canadian Occupational Performance Measure), FIM (functional Independence Measure), FMA (Fugl-Meyer Assessment), FRT (Functional reach test), MAS (Motor Assessment Scale), MAL (Motor Activity Log), MFT (Manual Function Test), NIHSS (National Institute of Health Stroke Scale), MOHO (Model of Human Occupation), SIAS (Stroke Impairment Assessment Set), SIAS (Stroke Impairment Assessment Set), WMFT (Wolf Motor Function Test).

Table 3 Rehabilitation program contents for upper extremity

a. Intervention	N	%		N	%
1 task-oriented training	4	17.4	4 bilateral training, feedback of perfomance, High-frequency repetitive training, Mirror therapy, PNF, internal model, CIMT, transfer package, Control of muscle tone, evaluation of overall, on-elbow, wiping, tapping, fascilitation, U/E coordination, electrical stimulation	1	4.3
2 Repetitive facilitation exercise (Kawahira methods)	3	13.0			
3 IVES, treatment for each individual patient, reaching	2	8.7			

b. Training for stability, reaching of upper extremity function	N	%	c. Training for weight bearing, reaching	N	%
1 arm sling	23	100.0	1 training in supine and sitting, Reaching	22	95.7
2 voluntary movement (control the abnormal movements)	22	95.7	2 on elbow, on hand	20	87.0
3 voluntary movement (compound movements)	18	78.3	3 on all fours	19	82.6
4 balance training, voluntary movement	15	65.2	4 parachute reaction	13	56.5
5 voluntary movement (single joint exercises), resistance training	14	60.9	5 puppy position	12	52.2

d. Training for upper limb function	N	%		N	%
1 Bilateral arm training	22	95.7	5 High-frequency repetitive training	7	30.4
2 Task-oriented training	13	56.5	6 Mental practice, CIMT	2	8.7
3 Mirror therapy	9	39.1	7 EMG biofeedback	1	4.3
4 electrical stimulation	8	34.8	8 Virtual Reality, rTMS, tDCS	0	0.0

e. Theoretical model	N	%		N	%
1 PNF	4	17.4	4 ICF, Motor larning, IVES, splint, OTIPM, CMCE, CIMT, Biomechanical approach, Cognitive perceptual approach, Psychosocial approach, PEOP mode, Manual Therapy, Ueda method, JF, treatment for each individual patient, Control of muscle tone, Control of posture, Repetitive facilitation exercise (Kawahira methods)	1	4.3
2 Bobath concept	3	13.0			
3 MOHO	2	8.7			

CIMT (Constraint-induced movement therapy), CMCE (The Canadian Model of Client-Centered Enablement), IVES (Integrated Volitional controlled Electrical Stimulation), JF (joint facilitation), MOHO (Model of Human Occupation), OTIPM (Occupational therapy intervention process model), PEOP model (Person Environment Occupation Performance model), PNF (proprioceptive neuromuscular facilitaition), rTMS (Repetitive transcranial magnetic stimulation), tDCS (Transcranial DC stimulation).

tance training.

3) Weight Transfer and Reaching Function Exercises

Exercises performed included sitting and standing position exercises, reaching movements, body weight support on elbows or hands, and crawling.

4) Grasping Function Exercises

Exercises performed included RFE therapy, mirror therapy, Hybrid Assistive Neuromuscular Dynamic Stimulation (HANDS) / IVES, and two-handed movements.

5) Upper Limb Function Exercises

Arm ring exercises were performed at all institutions surveyed. Other exercises included task-oriented training, mirror therapy, electrical stimulation, and high-frequency exercise training.

6) Theoretical Models

Therapy was rarely based on theoretical models: those few cited included proprioceptive neuromuscular facilitation (PNF), the Bobath concept, and the model of human occupation (MOHO).

5. Open-ended question (Table 4)

1) Treatment Methods of Interest

Respondents mentioned RFE therapy, the Bobath concept, IVES, and CIMT; however, mentions were few for all methods.

2) Treatment Methods Deemed Effective

Respondents mentioned CIMT and RFE therapy; however, mentions were few for all methods.

Table 4 Interesting rehabilitation intervention

a. interesting method

		N	%			N	%
1	RFE (Kawahira methods)	5	21.7	4	HAL for upper limb, Biomechanics Therapy, Cognitive Therapeutic Exercise	1	4.3
2	Bobath concept	3	13.0				
3	IVES, CIMT, robotic training, PNF	2	8.7				

b. effective method

		N	%			N	%
1	CIMT	6	26.1	5	PNF, transfer package, FES	2	8.7
2	RFE (Kawahira methods)	5	21.7	6	rTMS, internal model, IVES, VIMS, Control of muscle tone, Control of posture, Actual training, AKA, big-picture view, HANDS, Brunnstrom concept	1	4.3
3	treatment for each individual patient	4	17.4				
4	Bobath concept	3	13.0				

AKA (Arthrokinematic Approach), CIMT (Constraint-induced movement therapy), CMCE (The Canadian Model of Client-Centered Enablement), FES (functional electric stimulation), HAL (Hybrid Assistive Limb), HANDS (Hybrid Assistive Neuromuscular Dynamic Stimulation), IVES (Integrated Volitional controlled Electrical Stimulation), OTIPM (Occupational therapy intervention process model), PNF (proprioceptive neuromuscular facilitaition), RFE (repetitive facilitative exercises), rTMS (Repetitive transcranial magnetic stimulation), VIMS (Visually-Induced Motion Sensitivity).

3) Free description

In addition, OT reportedly resulted in not only improved upper limb function, but also heightened satisfaction on the Canadian Occupational Performance Measure (COPM), making it an important outcome for measuring therapeutic efficacy.

Occupational therapists tend to give priority to the individuality of patients when deciding a treatment course: they regard OT's ultimate goal as not only recovery from functional impairments (e.g., limb paralysis) and activity limitations (e.g., self-care), but also lifting of restrictions on social participation caused by interactions between background and environmental factors in typical individuals. Therefore, task-specific training with exercises that patients can repeat at a high frequency is necessary[9)~11)]. Using the Delphi method, the authors created an upper limb exercise task for post-stroke patients that fits this criterion, based on a survey sent to occupational therapists[12)], and are continuing research on the subject.

Discussion

By using a self-administered questionnaire, this survey was conducted to determine what kind of assessments and interventions are performed during the convalescence phase after stroke; this study focused on the treatment of impairments of the upper extremity.

The assessments that were actually performed included many conventional procedures such as the BRS, grasping power, pinch, range of motion (ROM), and alignment; there were also many assessment methods to determine impairments such as muscle strength, ROM, and alignment. For the assessment of upper extremity function, grasp function and prognosis, the BRS was commonly used. For the assessment of upper extremity function, the Simple Test for Evaluating Hand Function (STEF), which was developed in Japan, was widely used. However, there were a few responses that included assessment methods such as the Motor Activity Log (MAL), Wolf Motor Function Test (WMFT), Action Research Arm Test (ARAT), and the Box and Block test, which are commonly used in foreign countries. For the assessment of ADL, the Functional Independence Measure (FIM) and Barthel index accounted for the majority of responses.

Many of the assessment items in the responses are used conventionally in Japan and are limited to the assessment of impairments such as paralysis caused by stroke, secondary loss of muscle strength, and disturbances of excursion, rather than assessments of upper extremity function and the ability to perform a task. Upper extremity function and ability were assessed using ADL measurements, such as the FIM. It is believed that more specific assessments of upper extremity function and assessments that can predict prognosis are also necessary. In addition, in Japan, we found little use of the assessment batteries used in other countries; this finding revealed that the spread of specialized stroke assessment methods has not been adequate.

The responses about the actual trainings performed revealed that an arm sling was used for the upper extremity function at all the institutions. Voluntary movement training was conducted while controlling abnormal movements, and reach training, weight bearing with the elbow and the hand, and bilateral movement training were also performed at most of the institutions. In addition, weight shift, balance training, task-oriented training, and electrical stimulation were conducted at many institutions.

Although there is evidence that the use of the unaffected side promotes learned nonuse of the paralytic hand and inhibits the improvement of paralysis in the upper extremities, an arm sling which fixed the paralytic hand was used at all the institutions. We presume that the fixation of the upper extremity during moving or walking was given priority over interventions, to address neuroplasticity. In addition, bilateral movement training using the hand of the unaffected side was performed; from the viewpoint of interhemispheric inhibition, activity in the cerebral hemisphere of the affected side could be reduced by such training. Given the above findings, the actual therapies performed included many conventional training approaches, even though the efficacy of newer rehabilitation methods, which are based on neuroplasticity, has been established. However, it is possible that an arm sling was used to protect the shoulder, and bilateral movement training was used because it was difficult for patients with severe paralysis to manipulate an object with the paralytic hand. Furthermore, even though the efficacy of constraint-induced movement therapy (CIMT) and repetitive facilitative exercises have been demonstrated, a few institutions conducted these therapies. For this reason, it was thought that CIMT was limited to mild cases based on the eligibility criteria. CIMT needs to be understood by the institutional staff as well as the therapists, which seemed to result in a small number of institutions where CIMT was conducted. Repetitive facilitative exercise may have been difficult to perform because the therapists have to receive special training. Similarly, the number of institutions where proven therapies, such as transcranial magnetic stimulation and botulinum, were used was low because these treatments require expensive instruments; the hospitals may be constrained by the advanced medical technology these treatments employ.

The limitations in self-care caused by stroke are a major problem. It is not realistic for patients to perform physical exercise of the paretic hand alone; it is necessary for patients to learn to compensate and perform self-care by using the hand of the unaffected side. Furthermore, the type of therapy delivered and the contents of the training may vary depending on the severity of the paralysis and whether the paralysis occurred in the dominant or non-dominant hand; these potential determinants should be examined in the future.

Some specific therapeutic interventions that were very common, such as task-oriented training, mirror therapy, and integrated volitional control electrical stimulation (IVES), were performed in half of the institutions. We think that this is because the efficacy of their therapeutic effects has been demonstrated and they were interventions that occupational therapists find them easy to perform. We implemented occupational therapy interventions that combined task-specific training and electrical stimulation and found improvements in the frequency of the use of the paralytic hand[13].

There are a few reports on the specific content of training from previous studies. When compared with physical therapy and speech therapy, it has been reported that function-focused intensity (e.g., dressing, excretion, and grooming activities focusing on ADL) rather than impairment-focused intensity (focusing on sensory, recognition, and motor), reduced the severity of stroke impairments[14]. Not only the number of repeated trainings but also the content of the training need to be examined.

According to a survey of the types of occupational therapy interventions used for stroke patients at several institutions[15], upper-extremity control showed the largest percentage of interventions, followed by dressing, examination/evaluation, and pre-functional activities. Upper-extremity control includes the training of normal movement of the upper extremity or facilitative exercises, muscle strengthening exercises, and range of motion exercises. Pre-functional activities were associated with the functional activities of the upper extremity or included preparations function activities. The same types of therapies were conducted to treat upper extremity function after stroke was reported in our study. Consequently, it was found that activities of daily living (ADL) such as dressing and physical exercises of the upper extremity were conducted during occupational therapy[16]. As for the association between dressing training and ADL ability, when the FIM score for upper extremity (UE) dressing does not reach 5 points, the entire FIM score is low[7]. Consequently, improvements in dressing ability associated with the upper extremity function may improve the ability to perform other ADL.

According to the stage theory of recovery of post-stroke motor paralysis, unless the excitability of the corticospinal tract is preserved during the three months after the stroke onset and interventions to improve the excitatory response of the new transcortical network are performed, the efficiency of synaptic transmission caused by rehabilitation cannot be obtained[17]. It is necessary to provide intensive rehabilitation during the recovery period. Our survey results indicate that the mean hospitalization was 83.8 days, and intensive rehabilitation intervention was performed within those three months.

According to the results of our study, direct intervention treatment time of 3 units (60 minutes) per day accounted for 55% of responses. However, recovery of the paralytic hand depends on the frequency of the use, and it is necessary to examine whether the intervention time of 60 minutes is adequate.

In a survey of the volume of the occupational therapy for stroke patients in the U.S.[7], the hospitalizations were as short as 10.7–23.1 days; thus, those results cannot be directly compared with our data. However, considering that the number of hours that occupational therapy was conducted per day was as short as 27.2–43.1 minutes/day, it was thought that training time was consistent to some extent. According to a report on the survey of the actual state of rehabilitation in Japan[18], the rate of ADL improvement may increase by shortening the days until rehabilitation is initiated after the stroke onset, increasing the amount of training in physical therapy and occupational therapy from 18 units to 21 units, and increasing the amount of training by 1.17 times. In addition, it suggested the importance of voluntary training. Since our study was performed in convalescent rehabilitation wards, the training volume per day reached 21 units, which meant that the amount of training was adequately maintained. However, this report also advocated the importance of implementing voluntary training. The role and implementation of voluntary training should be studied in the future. It has been reported that the duration of the rehabilitation treatment period, and the frequency of the use of the paralytic hand are important for recovery of the upper extremity function after stroke, and that recovery depends on the number of repeated training sessions. Consequently, the importance of repeated training for stroke has been proposed. However, even in a large-scale survey on the content of training provided by physical therapists and occupational therapists, it was reported that the physical exercise of the upper extremity was performed by about half of the respondents and the number of repetition was an average of around 50 times, which indicated that the number of repetitions was lower than that in the training of the lower extremity[19]. In reality, it is difficult to implement repeated trainings to improve upper extremity function after stroke. According to a report comparing the changes in the score of the number of repetitions and the ARAT, at least 300 times/sessions are necessary, and upper extremity function is improved at 5,000 times or more[20].

Limitations of This Study

1) Since there was a low number of responses, the results cannot be generalized; 2) A survey on the amount and frequency of the interventions and the importance of voluntary training is necessary; 3) The association between the dominant hand, the side with paralysis, and the stroke severity should be examined; 4) Since meaningful functional recovery varies depending on the patient, task choice that takes individual preference into account should be considered.

Conclusion

We conducted a survey using a written, self-administered questionnaire to determine the actual assessment and training methods used for the rehabilitation of the upper extremity during the recovery period after stroke. The results of the present study show that evidence-based evaluations and training content been reported, but the rate of actual implementation is low. In contrast, new initiatives such as electrical stimulation and task-oriented training have been undertaken. Although the amount of training and duration are consistent to a certain extent, the number of repetitions remains insufficient. It will be necessary to use appropriate means of evaluation to determine which upper extremity tasks can be repeated, including self-training.

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白濱　勲二

日本における脳卒中上肢機能障害に対するリハビリテーション評価と介入の調査

白濱 勲二
神奈川県立保健福祉大学リハビリテーション学科

―キーワード―
脳卒中，作業療法介入，上肢機能

【背景】リハビリテーション介入は，治療効果を考慮して実施されなければ，意味のある機能回復をもたらすことができない．本研究の目的は，回復期リハビリテーション病棟において，脳卒中患者に実際に実施された評価項目と介入内容，基づく治療理論，関心のある治療法，および，上肢機能の改善に有効であると判断している治療法を調査する事である．

【方法】無作為に抽出された 102 人の作業療法士を対象とした．アンケート調査は，郵送による自記式調査とした．先行研究をもとに抽出した評価項目（57 項目）と介入内容（78 項目）を提示して，実際に実施した項目を選択させた．

【結果】回答は 23 施設（回収率 22.5%）から得られた．平均入院期間は 83.8±16.0 日，作業療法士一人当たりの平均患者人数は 10.8±8.6 人/日，実施単位数は 21.9±19.4 単位/日であった．

評価項目：把握機能は，握力，関節可動域，ブルームストロームステージ(BRS)，ピンチ，簡易上肢機能検査，機能的自立度評価表(FIM)．バランス能力は，座位・立位，肩関節可動域，体重移乗，運動能力．上肢機能は，BRS，FIM，Barthel Index(BI)，プレーシング．上肢機能は，静的および動的アライメント，BRS，肩関節評価．上肢機能の予後は，BRS によって評価された．

上肢機能訓練：上肢機能への介入方法は一定の傾向はみられなかった．アームスリングは，すべての施設で使用された．CI 療法および反復促通療法の効果が示されているにもかかわらず，実施施設はわずかであった．

【結論】評価項目は，新しい評価項目は少なく，従来の評価が実施されていた．CI 療法と反復促通療法は，ほとんど実施されていなかった．本研究の結果から，エビデンスのある評価方法と介入内容は，作業療法士がその有効性を認識していても実施率が低いことが明らかとなった．

利益相反：利益相反基準に該当無し

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