A survey of home based rehabilitation model performance for movement disorders caused by neurological injuries

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Abstract: The aim of this study was to determine the efficacy of home based rehabilitation model performance for movement disorders caused by neurological injuries. Method: 24 volunteers with movement disorders caused by neurological injuries were included in the study. The participants randomly assigned in one of the two groups, the interventional and the control groups. Intervention program was carried out at home. The average ages of the two groups, interventional and control, were 5.8 and 6.3 years, respectively. Two measurements were applied to determine any alteration in patient improvement: Barthel index was used for measurement of ADL, and EQ-5D (euroqol) was used for quality of life. The assessments for the two groups were carried out twice (pre-tests and post-tests). Reassessments were carried out for the two groups at the end of week 5. Results: Comparison of pre- and post-treatment assessment results of Barthel index in the interventional group indicated a difference in terms of recovery, ($P < 0.05$). Comparison of pre- and post-treatment assessment results of quality of life in the interventional group indicated a difference in terms of recovery ($P < 0.05$). The results of the two assessment methods: Barthel index and quality of life, revealed no significant differences between pre and posttests. Conclusion: The results of this study proved that home based rehabilitation model may enhance the function of the patients and improve the family quality of life.
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1. Introduction

Due to high costs of based rehabilitation approach in health centers, it's not affordable to provide required application for early rehabilitation in many cases and is not able to fix requirements of patients with disabilities and their families. Expenses due to the disability, low income of families, and the problems with mobility disabilities, especially in the early days after discharge from the hospital or long-term disabilities are significant factors that affect the mental health of families while these families may deal with high or unusual costs. (1)

In one hand, these requirements develop the needs to create a more effective method for patients and on the other hands, their families have better access to specialized rehabilitation services in the community. This change is inevitable, especially in the developing world.

The most appropriate places for rehabilitation of these patients are hospitals and rehabilitation centers that can provide specialized services for patients with disabilities, while many of the poor people have no access to central rehabilitation services to continue their rehabilitation and most of these people have limited access to rehabilitation services in certain situations, such as the time of discharge from hospital (2).

The method of rehabilitation services at home is a method that have been less considered in our country and evidence of the effectiveness of this type of service in our community is not correct or is very low.

Katz-Leurer et al. have studied twenty children with movement disorders (cerebral palsy and stroke) for the home rehabilitation. In their study, daily normal activities associated with active rehabilitation exercises were considered for one group, while daily activities were given for the other group and after six weeks of intervention had reported that a home-based rehabilitation and training improved children's performance and balance (3).

While in the study of 2011 on the Cp patients at home, it was reported that exercises at home although improved some performance indicators, but no changes was happen in the balance of children and their walking speed (4).

In a study Powell et al., employed a home rehabilitation program on the patients with severe head injury in two days a week for 27 months. Age range of the patients was varied (16 1o 65 years old). They reported that despite the chronic damage,

improvement was observed in treatment. Barthel index as assessment tool has been used in their study (5).

In 2014, in a study three strokes rehabilitation were evaluated and those who were treated with this intervention at home or day center for rehabilitation had revealed improvements in walking and balance in their situation (6).

In the other study in 2015, a twenty weeks training home-based program was carried out on the Cp children, in this study the patients used internet for training program, and at the end of the study the investigators reported improvement of functional abilities and ADL in all the patients (7).

In a study in the UK, within period of six months, rehabilitation methods at home were compared with hospital rehabilitation in order to assess Barthel index and it was found that rehabilitation at home have had good results for patients. (8)

In a study in 2004, exercises were carried out based on the community on the people over 65 years old and the quality of life and costs associated with mental health were evaluated. At the end of the study it was reported that community based rehabilitation improves the quality of life and reduce costs for health. (9)

Studying the quality of life for the disabled patients is one of the indicators that have been considered in recent years. King in 1996 have studied the quality of life of stroke and reported that people with strokes that are supported by the families have higher quality of life. (10)

However, the studies do not provide enough evidences to support a system of provided services. There is not yet enough available documents to demonstrate the superiority of rehabilitation programs at home and in the hospital that were low or not available (1).

In Iran, results of the studies are not available or are very limited. Nevertheless, since there are a few numbers of studies in the field of rehabilitation services at home due to the reference of patients to rehabilitation centers especially in the first discharge. Therefore, the aim of this study was to determine the method and impact of rehabilitation services at home for the disabled in the city of Semnan, Iran.

Methods:

This quasi-experimental study was available for sampling. 24 volunteers with neurological disabilities caused by motor disorders of neurological damage were studied in two groups, including the intervention and control groups.

The average age of the intervention group was 8.5 years old while in the control group it was 3.6 years. The volunteers were people who were referred by a doctor from the hospital or rehabilitation centers or disabled who were referred for rehabilitation services.

Patient or family completed consent form and after the completion of the sample form they were placed in one of the groups of intervention or control group randomly. According to the schedule, two therapists were determined to send to the patient home and rehabilitation programs were initiated in the patient's home.

Therapy sessions were three times a week for five weeks. In previous studies, the number of sessions had been suggested 15-20 minutes for each patient of rehabilitation at home. (8).

Rehabilitation programs included home visit and providing advices to families about the barriers at home, matching the home equipment due to the requirements of disabled and home care practices and ADL, performing techniques and therapeutic exercises and correct positions taking care and family education for taking care and continuous training.

Training activities using the training manual (Appendix B) or consulting experts to create awareness and participation in individual and family health education, daily living skills, prevention of disabilities and how to adapt severely disabled person living conditions.

Inclusion criteria: Having a neurological impairment leading to movement disorders, signed a consent form for the study.

The patient does not receive pain medication or other methods of rehabilitation.

Living the patients with disabilities in the city of Semnan, Iran.

Having movement disability in more than one limb (involved in at least one lower limb), more than three years should have been passed of disease.

Exclusion criteria: Having other physical diseases that affect treatment such as heart or lung disease.

Characteristics of patients in the two groups is shown in Table 1.

Assessment tool:

Researchers have used several tools to assess the effectiveness of changes resulting from rehabilitation programs provided for patients at their homes. Barthel index Test is a tool to evaluate the activities of daily living and mobility, and its validity and reliability was evaluated before and reported the test has a good reliability. (11, 12)

Test of (Euroqol) EQ-5D is a tools to assess the quality of life in various diseases and its reliability has been approved and it is recommended for stroke

patients to complete evaluation questionnaire with the help of the interviewer (13).

The Gross Motor Function Classification System (GMFCS) is designed for children with cerebral palsy. It is used in order to assess Self-initiated movements with an emphasis on applying Sitting, transfer, mobility. This test is a 5 level system that assesses the functional limitations of the patients and its validity and reliability has been approved. (13)

The therapy program; the techniques of child rehabilitation program including stretching, strengthening and muscle re-education, training, daily living activities, guidance on how to manage the child's parents and guiding for better handling to access the child's displacement at home, consult with parents and evaluation and prescribe orthotics and assistive devices.

Table 1: Characteristics of patients in the two groups

No	Group	Age (years)	Sex	Diagnosis
1	I	1	M	CP
2	I	4	M	CP
3	I	1.5	M	CP
4	I	9	F	Spina bifida
5	I	9	F	CP
6	I	3	F	Erb palsy
7	I	12	M	Erb palsy
8	I	10	M	CP
9	I	1	M	CP
10	I	9	M	CP
11	I	3	M	CP
12	I	8	M	CP
13	C	14	F	CP
14	C	9	F	CP
15	C	13	F	CP
16	C	8	M	CP
17	C	2	F	CP
18	C	7	M	Erb palsy
19	C	4	F	CP
20	C	1	M	CP
21	C	5	F	Erb palsy
22	C	8	F	CP
23	C	3	M	Erb palsy
24	C	9	M	CP

I: Intervention *C: Control* *CP; Cerebral palsy*

Ethical considerations:

The anticipated therapeutic techniques in this study are acceptable techniques in rehabilitation. The study was initiated with coordination and consent of the patients or their family. The consent form was completed and the performing the study did not affect to any losses. The actual outcome of the problem and the patient's family received her therapist became aware of realistic goals. Occupational therapy interventions do not interfere with other rehabilitation services.

Limitations:

Lack of access to sufficient samples required and the lack of similarity of characteristics and movement disorders such restrictions were restrictions of the plan.

As well as factors such as heterogeneity of some cases including time and intensity or extent of disability were the factors affecting the results however using activities including consistent of the patients in the intervention and control groups was an attempt to reduce these factors.

Results:

The results of the pre-test and post-test of the three assessments methods using rehabilitation program at home is explained; in the Test of Barthel index provision of rehabilitation services in-home is significantly improve personal autonomy.

Barthel index showed significant improvement (P = 0.05) during the five weeks treatment program (pre and post tests), Table 2.

Table 2: the mean and standard deviation of BI test in the pre and post test using the paired t-test

Group Name	Pre- Test	Final Test	P- value
Control	29.83 22.57	29.83 22.51	258.0
Test	40.83 32.32	47.08 34.27	0.001

The comparison of mean of changes between the two groups ofBI (experimental and control groups) in five weeks using independent t-test showed a significant difference between the experimental and control groups (P<0.5), Table 3.

Table 3 compares the average difference between the control and experimental groups in the BI test

Group Name	Control	Experimental	P- value
Test B1	0.83	6.25	0.01

The results of the pre-test and post-test health showed that the provision of services at home had significant results in improving health. (P<0.05). In Table 4 mean and standard deviation for health status (pre-test and post-test) during five weeks of training, is shown.

Table 4: comparison of mean and standard deviation of health status at pre-test and final test steps using the test.

Group Name	Pre- test	Final	P- value
Control	28.75 13.16	32.50	0.01

Comparison of the mean of changes in health status between the two groups (control and experimental groups) for five weeks using independent t-test showed that there was no significant difference between control and experimental groups.

In Table 5, the changes in functional levels of authorities have been inserted due to their age group and generally in the experimental had promoted to another level of performance. In the control group there was no change in the level of performance.

Table 5. Gross Motor Function Assessment Results (GMFCs-E & R)

Group Name	Control	Experimental	P- value
Health status Test	2.91	20	0.000*

Table 6 and 7 indicate the results of Gross Motor Function Assessment (GMFCs-E & R) and changing of the group level of the patient during the program for the two groups.

Result and Discussion:

In the present study, the effect of providing quality services at home has been examined on activities of daily lives and life satisfaction of Neurology patients and their families. Although there are limited numbers of documentation and evidence

in Iran about provision of rehabilitation services at home, but several studies have been conducted in other countries. The results of some studies are consistent with this study, for example, in 2009 a study was performed on rehabilitation at home for children with movement disorders. 6 weeks continuous rehabilitation exercises in the experimental group were provided. In the end, resulting in improved motor function and balance were observed in children (3).

The results of the present study were also consistent with the study of Novak Luna and colleagues (14). In this study, the effectiveness of occupational therapy program at home was studied for children with CP. In this article, the children and their parents, their participation and achieve the objectives of the treatment were considered. In this study, 36 children with CP with an average age of 7.7 years were evaluated. The duration of treatment was 8.4 weeks. The assessment scale was Canadian Occupational Performance Measure (COPM) that after the study the authors reported good results in performance and parental consent. The overall results were significantly different from the control group.

In another study, Craig Anderson and colleagues were assessed early discharge from the hospital's performance and implementation of the rehabilitation program at home. In this study, 86 stroke patients in the acute phase with a mean age of 75 years in the study and control groups. During the study period was 6 months. Study group immediately released from the hospital and rehabilitation services received at home. They reported that patient satisfaction, reduce the length of hospital stay, improved rehabilitation outcomes and savings in direct costs, including the results of this study. At the end of the study 42% of the study group had a good recovery and was discharged in general. Remaining 22% with sever disability and 8% did not continue to cooperate (15).

Table 6. Intervention group: the results of changing the level of functional gross movements (GMFCs-E)

No.	The age group	pretest	Post test
1	6-12	V	V
2	2-4	III	II
3	6-12	II	I
4	Up to 2	V	IV
5	Up to 2	V	IV
6	4-6	V	IV
7	9-12	V	IV
8	6-12	III	II
9	2-4	III	III
10	6-12	II	I
11	6-12	III	II
12	6-12	IV	III

Table 7. The control group: results of changing the level of functional gross movements (GMFCs-E)

No.	The age group	pretest	Post test
1	6-12	V	V
2	2-4	V	V
3	6-12	IV	IV
4	Up to 2	III	III
5	Up to 2	V	V
6	4-6	V	V
7	9-12	IV	IV
8	6-12	IV	IV
9	2-4	V	V
10	6-12	V	V
11	6-12	V	V
12	6-12	III	III

In another article chaiyawat and colleagues (16) studied the effectiveness of rehabilitation programs at home for ischemic stroke patients. In this study, 60 patients in the placebo and intervention groups were studied. In the intervention group had better results than the control group. All aspects of the EQ-5D reduce significantly better in the intervention group than the control, especially in the quality of life and overall health status.

However, some studies also reported different results, Hale (1) reported that there is not enough evidence to support a delivery system for rehabilitation and still there is no evidence showing home based rehabilitation is better than the other models. Also it is suggested that despite the fact that the home based service shortens the hospital stay, advantages or disadvantages of this method is not yet fully known (17).

In a study reported in the home rehabilitation services have an impact on pain relief and patient satisfaction, quality of service is not. (18)

The reason for these differences may be attributed to the methods of the studies, the extent of the factors affecting the results of the treatment at home, and limitation of documentation and evidence cited, However, previous studies have suggested that rehabilitation of patients at home is complicated and some factors such as the needs and characteristics of individual and cultural aspects affect the results (19).

In a study Wee suggested that people who are disabled are preferable to be transferred to a center or nursing home before going home to be ready to enter the home and the community.

However, some researchers have reported that individual, familial, social, economical factors may affect the results of the community-based rehabilitation programs in varied degrees (20).

This preliminary study suggests that based home rehabilitation services, could increase function and satisfaction of patients and their families.

Conclusion:

The results of this study showed that home rehabilitation services leads to promote the independence of the authorities, improving the quality of family and motor function improvements. However, it is recommended that further research needed on the field of home base rehabilitation with a specific group and more patients.

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