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Effects of Home-based Physical Therapy on Functional Outcome of Disabled Elderly: the Experience of Miaoli County in Taiwan

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Abstract. [Purpose] In response to the increase of Taiwan's aging population, and to improve the daily living function and quality of life of the elderly, the government of Miaoli County has implemented a ten-year long-term care program providing home-based physical therapy services. The purpose of our study was to design an assessment form and analyze the effects of home-based physical therapy. [Subjects and Methods] Disabled elderly who received home-based physical therapy were identified, and therapists provided treatment and evaluated their functional improvement using the designed home-based assessment form. [Results] The results of our study show that the total correlation coefficient (r) of test-retest reliability was 0.89 and the internal consistency reliability had a Cronbach's α was 0.91. The test-retest reliability was high as assessed by the intraclass correlation, and the home-based assessment form was highly correlated with the Barthel Index. Among the 255 subjects (age: 76.88 ± 9.69), 120 (47.1%) had cardiovascular diseases, and 108 (42.35%) had orthopedic diseases. Subjects received 4.54 ± 2.35 treatments, and the score of the home-based assessment form was 53.6 ± 23.8 before treatment, and 56.0 ± 21.0 after treatment. [Conclusions] After a clinical test for disability, the home-based assessment is a suitable assessment of improvement of function ability. However, the number of subjects was too small and the treatment time was too short, and further investigation of this issue is still needed.
Key words: Home-based physical therapy, Long-term care, Disabled elderly

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INTRODUCTION

In response to the increase of Taiwan's aging population, and to improve the daily living function and quality of life of the elderly, the government of Miaoli County has implemented a ten-year long-term care program. It provides home-based rehabilitation services for the elderly. There are eighteen townships in Miaoli County of Taiwan. The population of this county is mainly comprised of 20–59 year-old, who account for 330,000 people, 59.13% of the population. The elderly population, aged over 65 years old, numbers is about 70,000 people, representing 13.32% of county's population[1)]. Therefore, the population of Miaoli County of Taiwan has entered the aging generation. The aging tendency shows that Miaoli County has a higher aging index than neighboring districts, such as Taoyuan County, Hsinchu County, and Hsinchu City in Taiwan[1)].

The elderly population of Miaoli County in Taiwan is gradually increasing, but the services of elderly care are still limited because of its remote district. There are also many problems in providing home-based physical therapy for disabled elderly[2)]. The government plans to promote long-term care via integration of regional hospitals and the establishment of a long-term care center. The assessment and functional status of disabled elderly needed to be recorded. The Barthel Index is the most commonly used index in long-term nursing care[3)], but it is not suitable for assessing the progression of home-based physical therapy. Therapists cannot easily record the effect of home-based physical therapy, because of a lack of a suitable Chinese functional assessment for the elderly in Taiwan. Toward this aim, we designed an assessment form and analyzed the effects of home-based physical therapy.

SUBJECTS AND METHODS

The long-term care center referral and treatment process are shown in Figure 1. We found that disabled elderly were referred to the local hospitals, and an assessment was needed for the treatment and re-treatment criteria for home-based physical therapy. The treatment programs include balance, indoor gait activities, flexibility and progressive strength training, and are professionally supervised by a physical therapist. The goals for home-based physical therapy for all disabled elderly are the establishment of safe transfers and independent functional activity.

We referred to previous studies[4, 5)], and designed the home-based assessment form for assessing the motor function of disabled elderly. This Chinese form contains 12 items: ability to independently feed and eat, wash face and

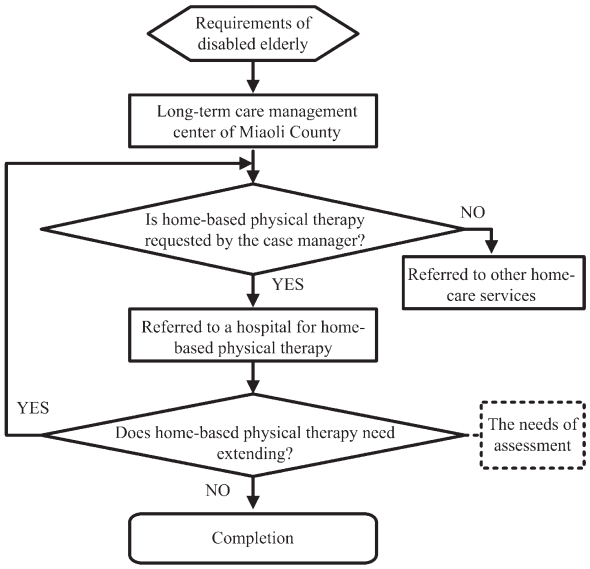

Fig. 1. The referral and treatment process

brush teeth, wear clothes, wear pants, take a bath or shower, urinate, defecate, transfer from toilet, take pants off before bowel movement, transfer from bed to chair or wheelchair, walk 45 meters, and walk up and down 12 steps. A 7-point scoring criterion is used. 7 points, completely independently; 6 points, needs assistive devices but independent; 5 points, need to be reminded and requires supervision; 4 points, minimum assistance (requires 25% assistance); 3 points, medium assistance (requires 50% assistance); 2 points, maximum assistance (requires 75% assistance); 1 point, fully dependent (requires 100% assistance). The reliability and validity of these items were tested by eight experts in the field of rehabilitation with an average 9.31 ± 4.67 years of experience.

This study procedure was approved by the Institutional Review Board of Human Research of Da-chien general hospital. The clinical tests were conducted from September 2010 to December 2011, and recruited subjects were the cases that were referred from the long-term care center of Miaoli County to the hospital. The records of physical therapy outcomes were analyzed using the statistical analysis software, SPSS 13. Wilcoxon's test was used to analyze the difference in each item between before and after physical therapy. We also used Spearman's correlation coefficient to examine the correlation between the scales of the home-based assessment form and the Barthel Index.

RESULTS

For the test-retest reliability within 2 weeks pilot testing of the home-based assessment form (Table 1), the total correlation coefficient (r) was 0.89 and Cronbach's α was 0.91. The test-retest reliability was high as assessed by the intraclass correlation, and the home-based assessment form was also highly correlated with the Barthel Index. The 255 subjects of home-based physical therapy, who were diagnosed as disabled elderly (Table 2), had an average age of 76.88 ± 9.69 years. The average number of treatment times was 4.54 ± 2.35, and the average total score of home-based assessment was 53.60 ± 23.77 (Table 3). After physical therapy, the total score increased to 56.01 ± 21.01, but there were no significant differences between before and after treatment ($p>0.05$) in any item except for "Transfer from bed to chair or wheelchair" ($p<0.05$). The Barthel Index score before treatment was 73.57 ± 30.28, and there was a positive correlation between the Barthel Index and the total scores of the home-based assessment ($p<0.01$).

DISCUSSION

After the home-based physical therapy, the average total score of the designed home-based assessment form increased by 2.41 ± 3.90. This shows that physical therapy improved the functional activities of the elderly at home. This is in agreement with the result of De Jonge et al.[6]. We also find that the time for contacting with family members or patients was insufficient due to fewer home-based physical therapies. Lin et al. indicated that detailed assessment records of home-based physical therapy need to be kept, starting with discharge planning records[7]. A single and suitable assessment form would help to record and improve the efficiency of home-care. Jao et al. expressed the opinion that a detailed record of home-based physical therapy needed to be integrated with those of home-care services provided by other health care professionals[8]. It would make the collation of patients' information more efficient. Therefore, the assessment record (containing the referral of the case report) and treatment records (including health education and rehabilitation) need to be clear and well-documented, in order to improve the effect of long-term care.

The results of this study found that the average number of home-based physical therapy treatments was only 4.54 times, and the treatment frequency was once a week. In a previous study of long-term care, it was reported that once a week home-based physical therapy improved lower limb motor function[9]. Lin et al. also found that weekly home-based physical therapy helped to improve the functional performance of patients with muscle atrophy lateral sclerosis and maintained their physical and mental functions[10]. The results of our study also found once a week home-based physical therapy helped the elderly to increase their functional abilities. When Wang et al. compared the effects of different courses of home-based physical therapy, they found a twice a week course had better treatment effects than a once a week course[11]. Therefore, we also suggest that the government should increase the treatment frequency and provide other treatments, such as occupational therapy and psychotherapy. This may significantly improve the functional abilities of the elderly.

Our home-based assessment scale was consistent with the Barthel Index, and could be used for the assessment of disabled elderly. Because the Barthel Index is used to record the individualize care services and supportive services, it is a common used evaluation tool for patients, and it is also a popular body function index in nursing care[3]. But its

Table 1. The test-retest reliability of the home-based assessment form

Items	Correlation coefficient (r)
Ability to independently:	
Feed and eat	0.89
Wash face and brush teeth	0.87
Wear clothes	0.90
Wear pants	0.91
Take a bath or shower	0.87
Urinate	0.87
Defecate	0.88
Transfer from toilet	0.88
Take pants off before bowel movement	0.87
Transfer from bed to chair or wheelchair	0.91
Walk 45 meters	0.89
Walk up and down 12 steps	0.90
Total	0.89

Table 2. The basic data of subjects

Items	Subjects (*n*=255)
Age	76.88 ± 9.69
Barthel Index	73.57 ± 30.28
Sex (male / female)	148 / 107
Diagnosis	
Cardiovascular disease	120 (47.06 %)
Orthopedics disease	108 (42.35 %)
Other diseases	27 (10.59 %)

The data of age and Barthel Index are shown as mean ± standard deviation, and each items of diagnosis is shown as *n* (percentage).

Table 3. Scores before and after home-based physical therapy

Items	Before (*n*=255)	After (*n*=255)
Ability to independently:		
Feed and eat	5.24 ± 2.01	5.29 ± 1.90
Wash face and brush teeth	4.08 ± 2.24	4.12 ± 2.20
Wear clothes	4.35 ± 2.15	4.57 ± 1.94
Wear pants	4.29 ± 2.18	4.44 ± 2.04
Take a bath or shower	4.35 ± 2.24	4.48 ± 2.10
Urinate	5.33 ± 2.21	5.45 ± 2.00
Defecate	5.29 ± 2.22	5.41 ± 2.02
Transfer from toilet	4.55 ± 2.16	4.65 ± 2.04
Take pants off before bowel movement	4.45 ± 2.25	4.64 ± 2.11
Transfer from bed to chair or wheelchair	4.56 ± 2.16*	5.27 ± 1.47
Walk 45 meters	3.78 ± 2.24	3.97 ± 2.07
Walk up and down 12 steps	3.32 ± 2.18	3.65 ± 1.98
Total	53.60 ± 23.77	56.01 ± 21.01

* $p<0.05$.

validity is deficient for home-based rehabilitation evaluation, and there are no adequate evaluation tools for home-based physical therapy. As all the rehabilitation programs in this research were physical therapy, we used a self-developed evaluation form, which is limited to home-based physical therapy.

In this study, the referral document of the case manager provided patients' basic information, Barthel Index and general status, which are not sufficient for determining subjects' disability and requirements for home-based physical therapy. This resulted in therapists spending time on their first visit re-evaluating patients, and highlights a problem in service coordination. Hsieh et al. discussed the family assessment model as a framework for patients' status evaluation[12]. The information collected by interview, including basic personal and family information, family development stage and tasks, environment, structure,function and pressure management, can be used for reference and as a guide for home-based physical therapy.

This research found that the home-based physical therapy only improved "transfer from bed to chair or wheelchair" ($p<0.05$). It means that the improvement of patients' function ability also can be found after a short treatment program. The improvement may have been a result of the home-based physical therapy training. This study was limited by the small number of subjects and the short treatment programs, and further investigation is required.

REFERENCES

1) Chiu TI, Spencer GA: Functional health status among rural and urban older adults in Taiwan: the effect of personal control and social control. Int J Older People Nurs, 2010, 5: 202–210. [Medline] [CrossRef]
2) Chen SL, Mefford L, Brown J, et al.: Predictors of American elders' home stay: a secondary data analysis study. Nurs Health Sci, 2008, 10: 117–124. [Medline] [CrossRef]

3) Chang SH, Wung SF, Crogan NL: Improving activities of daily living for nursing home elder persons in Taiwan. Nurs Res, 2008, 57: 191–198. [Medline] [CrossRef]
4) Kidd D, Stewart G, Baldry J, et al.: Functional independence measure: a comparative validity and reliability study. Disabil Rehabil, 1995, 17: 10–14. [Medline] [CrossRef]
5) Dodds TA, Martin DP, Stolov WC, et al.: A validation of the functional independence measurement and its performance among rehabilitation inpatients. Arch Phys Med Rehabil, 1993, 74: 531–536. [Medline] [CrossRef]
6) De Jonge KE, Taler G, Boling PA: Independence at home: community-based care for older adults with severe chronic illness. Clinical Geriatrics, 2009, 25: 155–169. [CrossRef]
7) Lin KH, Hu MH, Tang PF, et al.: The development of evaluation and referral system of physical therapy in discharge planning. FJPT, 2007, 32: 51–58.
8) Jao FC, Duh YJ: Improving muscular strength in home-care cases using multi-disciplinary physical therapy education. VGH Nurs, 2010, 27: 296–304.
9) Lin JH, Hsieh CL, Lo SK, et al.: Preliminary study of the effect of low-intensity home-based physical therapy in chronic stroke patients. Kaohsiung J Med Sci, 2004, 20: 18–22. [Medline] [CrossRef]
10) Lin KH, Hu MH, Chien WJ, et al.: The care pattern and effect of home physical therapy in individuals with amyotrophic lateral sclerosis: a preliminary report. FJPT, 2004, 29: 384–395.
11) Wang RY, Hsiung CL, Chen LH, et al.: Effects of home health physical therapy frequency on functional outcome of stroke patients. FJPT, 2003, 28: 65–70.
12) Hsieh CC, Huang HC: The application of family assessment model to physical therapy: a stroke case report. FJPT, 2005, 30: 243–249.