Effect of Continuous Home-Visit Rehabilitation on Functioning of Discharged Frail Elderly

Masahiro Kawagoe, MEng[1,2], Shingo Kajiya[3], Kentaro Mizushima[3],
Hiroki Yamasaka[3], Toshihiko Izuhara[3], Nobuhiko Bishu, PT, PhD[4] ,
Michiko Moriyama, RN, MSN, PhD[2]

[1]National Institute of population and Social Security Research: Hibiya Kokusai Building 6F,
  2–2–3 Uchisaiwai-cho, Chiyoda-ku, Tokyo 100-0011, Japan.
  TEL: +81 3-3595-2984, FAX: +81 3-3502-0636
[2]Graduate School of Health Sciences, Hiroshima University
[3]Kobe 100 Years Memorial Hospital
[4]Faculty of Rehabilitation, Kobegakuin University

Abstract. [Purpose] The purpose of this study was to verify of the effect of continued home-visit rehabilitation on the functioning of frail elderly who had been discharged from acute beds. [Methods] Subjects were 31 frail elderly (27 women) aged 67–97 years old who had been discharged from acute beds. Home-visit rehabilitation was provided for them immediately after discharge. Body functions (20 items), activities (24 items), participation (2 items), and health status (2 items) were evaluated at the start of home-visit rehabilitation (baseline) and 3 months later by physiotherapists (PT). [Results] Compared to the functioning at baseline, 3 months later we found that 1) independence level of standing, walking, moving around inside and outside the home, going up and down of the stairs, 2) activity situation during daytime and frequency of going out, 3) mental functions and depression tendency, and 4) anxiety of falling had improved significantly. [Conclusion] The results show that home-visit rehabilitation provided continuously to the discharged elderly brought an excellent effect not only on improvement of activities of daily living (ADL) and amount of activity but also on mental function and depression tendency.
Key words: Rehabilitation, Activities of daily living, Functioning, Elderly

INTRODUCTION

The long-term care insurance (LTCI) system was started in April 2000 in Japan. The number of LTCI users increased to 3.5 million people in April 2006 from 2.2 million people in April 2000. This has caused a rapid increase of LTCI expenditures, so the sustainability of the LTCI system has become an important policy issue.

The LTCI Act was last revised in April 2006. One of the main features of the latest revision is promotion of care prevention[1]. The act aims to support the elderly so that they can live as independently as possible within the community under any condition while functioning is maintained and reinforced. As for in-home services including home-visit rehabilitation, outcome evaluation is required as an indicator of functioning. Furthermore, functional differentiation and linkage to the provision of rehabilitation are promoted.

Rehabilitation at the acute and sub-acute stages is covered by health insurance. On the other hand,

rehabilitation at the chronic stage is mostly covered by LTCI. Hospitalization and post-hospitalization are supported by different insurance systems; therefore, securing and continuing rehabilitation is an especially important issue.

A randomized controlled trial performed in Northern Europe verified that home-visit rehabilitation was a very effective service from a functional maintenance viewpoint for discharged stroke patients[2,3]. However, in Japan few papers concerning the evaluation of the effects of home-visit rehabilitation are available[4,5]. In addition, indicators of activities of daily living (ADL), such as the Barthel Index (BI)[6] and the Functional Independence Measure (FIM)[7], are mainly used as outcome indicators. However, these assessment tools do not evaluate functioning[8], which includes the three levels of body functions and body structures, activity, and participation. These parameters are included in the basic concept of the International Classification of Functioning, Disability, and Health (ICF) that the WHO advocates.

This study verified the effects of continuous home-visit rehabilitation on the functioning of frail elderly discharged from hospital during the acute stage according to the ICF concept.

SUBJECTS AND METHODS

Subjects

The subjects were frail elderly discharged from a hospital with 199 beds for acute stage patients in Hyogo Prefecture between June 2007 and April 2008. Home-visit rehabilitation was provided by the hospital immediately after discharge. 31 out of 40 patients who provided their informed consent were evaluated. The rest of the 9 patients (5 improved, 3 hospitalized, and 1 patient due to other reasons) were excluded because follow-up was not feasible in 3 months.

Methods

In this study, the physiotherapists (PT), who conducted home-visit rehabilitation, evaluated the items associated with the functioning of patients discharged from the acute care section of the hospital immediately and 3 months after discharge. The items evaluated were the following: 1) profile (gender, age, frailty level, composition of family); 2) body functions (20 items): movement functions (3 items), weight maintenance functions (1 item), ingestion functions (3 items), mental functions (3 items), depression tendency (10 items); 3) activities (24 items); 4) participation (2 items); and 5) health status (2 items).

Regarding activity, the investigation included 21 Instrumental ADL (IADL) and ADL items in addition to daily decision-making, activity situation during daytime and frequency of going out. With IADL and ADL, both capacity and performance were evaluated. Capacity has four classifications (independence, supervision, partial assistance, total dependence); and performance has two classifications (doing, not doing). For body function, the patients were asked to fill out a 20-item questionnaire that included 5 questions from the Geriatric Depression Scale (GDS)[9]. Other items were subjectively evaluated by PT.

The change of each function item from immediately after discharge to 3 months later was analyzed. To compare the two groups, McNemar's test was employed for nominal scales while the Wilcoxon Signed Rank Test was used for ordinal and numerical scales. SPSS Version15.0J for Windows (SPSS Japan Inc.) was used for statistical analysis with a 5% significance cut-off.

In the implementation of this research, the content of the study was read out and an explanation was also provided for the subjects. Confidentiality was guaranteed: the subjects were promised that obtained personal information would be strictly managed based on the Personal Information Protection Law; the subjects would not to be identified and personal information would not be disclosed or used for purposes other than the original intent. It was also explained that non-participants would not be disadvantaged. The patients' informed consents were signed.

RESULTS

Subjects were 31 frail elderly (27 women and 4 men) with a mean age of 79.2 years (SD=7.5) at baseline. The frailty levels were "Support level 1–2" (14 patients), "Care level 1–2" (11 patients), and "Care level 3–5" (6 patients) (Table 1).

In comparison of the body function between immediately after discharge and 3 months later, significant improvements after the home-visit rehabilitation were shown on the enumerated items. Among the movement function items, the 2 items

Table 1. Patients Characteristics at baseline

Characteristics	n (%)
Sex	
Male	4 (12.9)
Female	27 (87.1)
Age (years)	
65–74	8 (25.8)
75–84	17 (54.8)
85–	6 (19.4)
Mean ± SD	79.2 ± 7.5
Level of the certified care (support) need	
Support level 1–2	14 (45.2)
Care level 1–2	11 (35.5)
Care level 3–5	6 (19.4)
Main diseases	
Central nervous system diseases	6 (19.4)
Orthopedic diseases	25 (80.6)
Number of household members	
One person	8 (25.8)
Two persons	16 (51.6)
Three persons	5 (16.1)
Four persons or more	2 (6.5)

"Do you walk continuously for about 15 minutes?"(p=0.031) and "Do you have strong anxieties about falling?" (p=0.003) were improved. The enhanced items in mental function included the 2 items "Do you constantly look at the phone then make a call?"(p=0.039) and "Do you occasionally fail to recognize a date?" (p=0.031). Among the 10 items on tendency to depression, 3 items "Are you basically satisfied with your life?" (p=0.039), "Do you still enjoy things you usually enjoyed?" (p=0.039), and "Do the things you could do before feel troublesome?" (p=0.003) were improved. However, no significant changes were found for the functions for weight maintenance and ingestion (Table 2).

In the comparison of the changes in activities between immediately after discharge and 3 months later, the independence level of the 5 following items among the 21 IADL and ADL items were enhanced: "Standing from a sitting position" (p=0.005), "Walking" (p=0.046), "Moving around inside the home" (p=0.034), "Moving around outside the home" (p=0.046), and "Up and down the stairs" (p=0.046). No significant change in performance was found though (Table 3).

Furthermore, from among daily decision-making (able to do, able to do except in special cases, difficult routine to do, unable to do), activity situation during daytime (often act, always sit down, always lie down), and frequency of going out (more than 4 times a week, 2–3 times a week, once a week, 2–3 times a month), activity situation during daytime and frequency of going out were improved significantly.

In the section on participation, the two items "Do you visit your friends' houses?" and "Do you maintain close contact with your family or friends?" were presented. Both items were noted to have improved but without statistical significance (Table 4).

Finally, for the health condition, "Subjective feeling of health" and "Subjective feeling of physical fitness" were asked. Both items were noted to have improved but without statistical significance (Table 4).

DISCUSSION

Preventing functional decline of elderly people has become an important policy issue from the point of view of securing the sustainability of the LTCI system. Home-visit rehabilitation is regarded as an effective service for preventing functional decline, but there are few theses which have evaluated its effect on functioning.

This study analyzed the effects of home-visit rehabilitation 3 months after discharge during the sub-acute stage on the functioning of 31 frail elderly discharged from an acute care hospital based on the ICF concept . The results revealed that home-visit rehabilitation promoted improvements in the activity and amount of activity, mental function, and depression tendency, as well as independence of ADL.

When the effect of home-visit rehabilitation was evaluated by capacity and performance in activity, capacity indicated that a significant improvement was shown in the independence levels of 5 items: "Standing from a sitting position", "Walking", "Moving around inside the home", "Moving around outside the home", and "Up and down the stairs". Kira et al. verified every change in the 10 items of BI at the start and the end of rehabilitation (average observation period: 10.5 months) for patients at the sub-acute and maintenance stages. They reported that a significant improvement was found in 5 items: "Transferring oneself", "Toileting", "Walking", "Up and down the stairs", and "Bathing"[5]. Our study showed a significant

Table 2.   Changes in body functions at baseline and 3 months later (n=31)

Questionnaire	enhance n	maintain n	decline n
Movement functions (ICF Code: b144[†])			
Do you walk continuously for about 15 minutes?	6	25	0 *
Did you fall during the past year?	2	26	3
Do you have strong anxieties about falling?	12	18	1 **
Weight maintenance functions (b530)			
Did weight decrease by 2–3 kg in the previous 6 months?	3	27	1
Ingestion functions (b510)			
Did it become difficult to eat hard food compared with 6 months ago?	4	26	1
Do you have choke on your tea or soup?	3	24	4
Do you worry about getting thirsty?	8	21	2
Mental functions (b144)			
Does someone point out that you are forgetting things?	5	26	0
Do you constantly look at the phone then make a call?	8	22	1 *
Do you occasionally fail to recognize a date?	6	25	0 *
Depression tendency (b152)			
Are you basically satisfied with your life?	8	22	1 *
Do you often get bored?	5	25	1
Do you prefer to stay at home, rather than go out and do new things?	4	26	1
Do you feel pretty worthless the way you are now?	4	27	0
Do you often feel helpless?	6	21	4
Don't you feel fulfilled in your life?	7	22	2
Do you still enjoy things you usually enjoyed?	8	22	1 *
Do the things you could do before feel troublesome?	12	18	1 **
Don't you think that you are useful person?	6	24	1
Do you feel tired without apparent reason?	8	23	0 [‡]

Enhance means that a change from a negative to a positive answer. Decline means a change from a positive to a negative answer. Maintain means no change of answer.

 P value was calculated by McNemar's test, *p<0.05, **p<0.01.

[†]: indicates a corresponding second-level IFC code number.

[‡] : "-" means uncalculated because of unproduced a 2×2 table.

improvement in mobility similar to the results of Kira et al. even though the previous study had different subjects and observation period. This suggests that home-visit rehabilitation mainly improves basic movement and ADL. On the other hand, in the items "Preparing meals", "Doing housework", "Maintaining a sitting position", and "Moving around outside the home", 4–5 patients showed improvements in performance (no patients showed deterioration),but a significant difference was not demonstrated. Capacity was evaluated with four classifications (independence, supervision, partial assistance, total dependence); whereas, performance was evaluated with only two classifications (doing, not doing). Hence, variation in performance may not have been detectable.

  Regarding the secondary effects of improvement of activity on other components of functioning, this study evaluated activity during the daytime and going-out frequency as activity items. Both items were significantly improved. A decrease in fall anxiety and the status of implementation of 15-minute walking related to movement functions were also significantly improved. The improvement of independence levels of movement centered on mobility appeared to have contributed to the improvement of activity.

  This study confirmed home-visit rehabilitation improved mental function and depression tendency, as well. Early studies indicated that the impairment of mobility is strongly related to depression tendency[10], and decrease in mental function and depression tendency are risk factors of decline in body functions[11–13].

   Home-visit rehabilitation is an intervention centered on basic movement and ADL training. It

Table 3. Change of capacity and performance of activities at baseline and 3 months later (n=31)

items	capacity			Performance		
	enhance n	maintain n	decline n	enhance n	maintain n	decline n
Preparing meals (ICF Code: d630†)	1	30	0	4	27	0
Doing housework (d640)	2	26	3	4	27	0
Sitting up (d410)	2	29	0	0	31	0‡
Standing from a sitting position (d410)	8	23	0**	0	31	0‡
Maintaining a standing position on one foot (d415)	3	27	1	4	27	0
Maintaining a sitting position (d415)	0	31	0	0	31	0‡
Walking (d450)	4	27	0*	1	30	0‡
Moving around inside the home (d460)	5	26	0*	2	29	0
Moving around outside the home (d460)	6	24	1*	5	25	1
Up and down the stairs (d455)	4	27	0*	3	28	0
Using transportation (d470)	3	27	1	2	28	1
Transferring oneself (d420)	2	29	0	3	28	0
Drinking (d560)	0	31	0	0	31	0‡
Taking medicine (d570)	1	29	1	1	30	0‡
Wash one's face (d510)	2	29	0	2	29	0‡
Putting on and taking off jackets (d540)	2	28	1	2	29	0‡
Putting on and taking off pants (d540)	4	27	0	2	29	0
Washing one's body (d510)	1	29	1	2	29	0
Urination (d530)	1	30	0	0	31	0
Defecation (d530)	1	30	0	1	30	0‡
Eating (d550)	0	31	0	0	31	0‡

Enhance means the improvement of independence and performance of each activity. Decline means the decline of independence and performance of each activity. Maintain means no change of independence and performance of each activity.
*p<0.05, **p<0.01
P value of capacity was calculated by Wilcoxon signed rank test, and that of performance was calculated by McNemar's test.
†: indicates a corresponding second-level IFC code number.
‡ : "-" means uncalculated because of unproduced a 2×2 table.

Table 4. Change of activities (3 items), participation, and health status at baseline and 3 months later (n=31)

Questionnaire	enhance n	maintain n	decline n
Activities (except IADL and ADL)			
Making decisions (ICF Code: d177†)	3	28	0
Activity situation in daytime	8	22	1*
Frequency of going out	13	18	1**
Participation			
Do you visit your friends' houses?	7	21	3
Do you maintain close contact with your family or friends?	6	22	3
Health status			
Subjective feeling of health	9	17	5
Subjective feeling of physical fitness	10	17	4

*p<0.05, **p<0.01
P value of activities and health status were calculated by Wilcoxon signed rank test, and that of participation was calculated by McNemar's test.

does not implement a direct approach to improvement of mental function and depression tendency. Therefore, the improvement of mental function and depression tendency are thought to be a secondary effect, a repercussion resulting from the improvement of independence levels of basic movement and ADL and the expansion of the range and amount of activities accompanied with the improvement of mobility.

The scope of this study is limited because the subjects were mainly orthopedic patients, who were discharged from a single medical institution. Consequently, generalization of the results is limited to some extent. The study by Kira et al., in which patients with cerebrovascular disease were evaluated, was generally in agreement (e.g. mobility improvement) with our study. It appears that the effects of the services were similar because both services shared the same purpose of maintaining and improving functioning, although each study had a different approach to the disease per se. We intend to further verify the generalization of the results by extending the type/number of institutions surveyed in the future.

Home-visit rehabilitation is a service which is little used among home services provided by the LTCI. A shortage of rehabilitation specialists active in this area is a large factor in this, but it is one of the factors which is insufficiently conveyed to care managers, subjects or their families.

For expansion of home-visit rehabilitation, we think it will be necessary to show evidence of improvements to patient's QOL, prevention of functional decline and the promotion of efficiency of the expenditure in a form which is visible policy makers, other service providers, and users and their families while making use of the general idea of ICF as a common language.

ACKNOWLEDGEMENT

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