



Original Article

Changes in social participation and life-space mobility in newly enrolled home-based rehabilitation users over 6 months

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Abstract. [Purpose] This study aimed to examine whether we were able to measure changes in social participation and life-space mobility of newly enrolled home-based rehabilitation (HR) users by using the activities and participation components of the International Classification of Functioning, Disability and Health (ICF) and Life-Space Assessment (LSA) over a 6-months period. [Participants and Methods] We enrolled 47 HR users who had suffered from a stroke or other condition within the previous year. A 6-month prospective cohort study was conducted. The performance qualifiers “d6 domestic life” and “d9 community, social and civic life” in the activities and participation components of the ICF and LSA were used. [Results] We observed significant improvements in the performance qualifier “d9 community, social and civic life” of the ICF over 3 months, and the LSA over a 6-months period. We also identified significant improvements in “d910 community life” and “d920 recreation and leisure” of the ICF. The LSA results showed that HR users had more frequent mobility within the neighborhood. [Conclusion] This study showed that newly enrolled HR users improved their social activities in the community, recreational activities, and life-space mobility over a 6-months period. These were measured using performance qualifiers from the ICF and LSA.

Key words: Home-based rehabilitation, Social participation, Life-space mobility

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INTRODUCTION

Home-based rehabilitation (HR) is implemented to provide services to community-dwelling disabled people according to their personal needs. It is conducted by a physical, occupational, or speech therapist, who visits such individuals at home. One of the differences from rehabilitation in hospital is that HR provides services to individuals who have difficulty going to hospital. In other words, HR users have severely limited mobility. HR provides services in order to help these individuals achieve social participation in their actual living environment. In Japan, the reduction in the average period of hospitalization¹⁾ has increased the importance of HR as a rehabilitation service after discharge.

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Systematic reviews have demonstrated that HR is effective for improving basic activities of daily living (ADL) of individuals who have suffered a stroke within 1 year and patients with musculoskeletal disabilities^{2, 3}. HR is also effective at improving transfer and balance^{4, 5}, reducing the duration of hospitalization, and improving ADL, with efficacy similar to or greater than that obtained by rehabilitation services in hospital⁶⁻⁸. Systematic reviews have also shown the possibility that HR could be effective at improving social participation, but no definitive findings have been obtained and further studies are required to confirm this^{4, 7, 9}. Social participation is a strong determinant of quality of life¹⁰ and important for maintaining cognitive function^{11, 12}.

The previous studies used the Frenchay Activities Index (FAI)¹³⁻²⁰, Nottingham Extended ADL Scale²¹⁻²⁴, Extended Katz Index^{15, 19}, and Lawton Instrument ADL²⁵ for scoring social participation. However, these measurement scales with limited categories may have insufficiently detected changes in HR users' social participation. That is because the needs of HR users in their daily lives can vary widely, so the HR program provided should also vary widely²⁶. Therefore, we investigated whether other measures are able to assess changes in HR users' social participation. Specifically, we adopted the performance qualifiers of "activities and participation" components of the International Classification of Functioning, Disability and Health (ICF)²⁷ and the Life-Space Assessment (LSA)^{28, 29} for this purpose.

Life-space mobility is related to physical function and health^{29, 30}. Some researchers thus attempted to use LSA as a scale for measuring the extent of the life space of older adults with mobility-related disabilities^{31, 32} and reported an improvement in LSA scores at 6 months³³, although they failed to show changes in the farthest trips taken or the frequency of travel.

In view of the above findings, HR has been demonstrated to be effective at improving transfer, balance, and basic ADL in cases of stroke and other diseases within 1 year in the community, although no reports have demonstrated improvements of social participation and the extent of life space. The purpose of this study was thus to examine whether we were able to measure changes in social participation and life-space mobility of newly enrolled HR users by using the activities and participation components of the ICF and LSA for 6 months.

PARTICIPANTS AND METHODS

We sent a letter asking for cooperation in a survey to 49 facilities that provide HR services in Ibaraki Prefecture (hospitals, clinics, geriatric health service facilities, visiting nurse stations) and obtained consent from 17 of them (34.7%). We included HR users of all ages who had suffered a stroke or an injury within 1 year and excluded those with malignancy, progressive neurological diseases, complete cervical cord injury, dementia due to degenerative diseases of the central nervous system, including Alzheimer's disease and dementia with Lewy bodies, and severe dementia that prevented their provision of consent, mental disorders, and congenital pediatric diseases. Physiotherapists or occupational therapists at the participating facilities selected candidates and asked them to cooperate in the survey. We studied those who consented and completed the 6-month survey.

We performed a 6-month prospective cohort study. The questionnaires were completed at baseline and 3 and 6 months later by physiotherapists or occupational therapists.

We measured personal factors, social participation, and basic ADL. Social participation was assessed using the activities and participation components of the ICF²⁷ and LSA^{28, 29}. We used FIM³⁴ to assess basic ADL.

Personal factors included gender, age, principal disorder, time period between onset/injury and baseline, time period between the beginning of HR and the survey, the Mini-Mental State Examination (MMSE) score³⁵, services used, age of the principal caregiver and relationship between them and the participant, specific profession of healthcare staff providing HR, frequency of HR (times/month), duration of HR (minutes/session), and provided services. Such services consisted of a total of 26 items in 5 domains: 1) evaluation and explanation of its results and the program (1 item), 2) physical and mental functioning and physical structure (7 items), 3) activities and participation (11 items), 4) environment (4 items), and 5) cooperation (3 items). For each of these, therapists filled out whether or not such services were performed and their total duration in the last month, in units of 5 min.

Regarding the ICF²⁷, we used second-level items in Chapter 6 domestic life and Chapter 9 community, social and civic life (hereinafter referred to as social life) of the activities and participation components of the ICF. Domestic life included 6 items: d610 acquiring a place to live, d620 acquisition of goods and services, d630 preparing meals, d640 doing housework, d650 caring for household objects, and d660 assisting others. Social life included 5 items: d910 community life, d920 recreation and leisure, d930 religion and spirituality, d940 human rights, and d950 political life and citizenship. We scored these items using the performance qualifiers of the ICF, which is graded as follows: "0: no difficulty" (continuous or frequent full participation with or without human caregiving), "1: mild difficulty" (occasional or partial participation without human caregiving), "2: moderate difficulty" (occasional or partial participation with human caregiving including watching and encouraging), "3: severe difficulty" (occasional and partial participation with full human caregiving), or "4: complete difficulty" (including prohibition)²⁷. The total scores range from 0 to 24 and 0 to 20 points for domestic and social lives, respectively. Lower scores represent more active participation.

LSA was developed to measure the life-space mobility of community-residing elderly people^{28, 29} and has high reliability and validity^{31, 36}. Recently, LSA has also been used in frail elderly who have problems with mobility³¹ and individuals with stroke sequelae³². In Japan, the validity of LSA was shown in the elderly who can live by themselves but experience some

difficulties with activities of daily living³⁷). LSA involves scoring the activity of going out by adding up the farthest that the HR user can travel in the five life-space levels (level 1, home; level 2 outside home; level 3, neighborhood; level 4, town; and level 5, outside town), the frequency of movement to each locus (less than once per week, 1 to 3 times/week, 4 to 6 times/week, every day), use of an assistance device, and independence for the last 4 weeks. Scores range from 0 to 120 points; the higher the number of points, the wider the area that the individual can access.

FIM³⁴) consists of a total of 18 items of basic ADL. Respective items were scored on a 7-point assessment (1 through 7) depending on the level of assistance required. The total score ranges from 18 to 126; a higher score represents less caregiving or greater independence. These items are divided into 13 items of FIM motor (13 to 91 points) and 5 items of FIM cognitive (5 to 35 points).

We determined the difference in the mean scores of the measurement scales among the three time points, namely, baseline and 3 and 6 months later. For statistical analysis, we tested the normality of the data, and used one-way analysis of variance and then Dunnett's test for multiple comparison for domestic life, social life, LSA, and FIM.

We then tested the difference in the mean scores of respective items among the three time points for the measurement scales for which a significant difference was observed, and in the mean scores of respective life-space levels for LSA. We used Friedman's test and then the Bonferroni test for multiple comparison. For LSA, we also calculated the frequency of travel within the respective life-space levels for which significant differences in mean score were observed among the three time points. We also counted the number of participants who were able to travel at respective levels of life space as the farthest that they could travel at the three time points. We used SPSS Statistics 24 for the analyses. $P < 0.05$ was considered to indicate statistical significance.

In the present study, the administrators of facilities, cooperating physiotherapists and occupational therapists, and the participants were informed orally and in writing of the study purpose, methods, voluntary nature of the study, and confidentiality of personal information and provided written consent to participate. The present study was approved by the institutional review board of Tsukuba Medical Center Hospital (approval No. 2013-021).

RESULTS

A total of 70 participants started at baseline and 47 completed the study after 6 months. Of the 23 participants who dropped out (10 at 3 months and 13 at 6 months), 8 and 5 did so because of admission to hospital/care facility and completion of HR upon attaining its goal, respectively. In addition, 2 shifted to ambulatory care services, 2 died, and 6 dropped out for other reasons.

The 47 participants had a mean age of 76.7 ± 11.1 years and 57.4% were male. The most frequent principal disorder was cerebrovascular disease (29.8%), followed by osteoarticular disorder (23.4%). The time period since onset/injury was most often (48.9%) between 9 and 12 months. The time periods between the beginning of HR and baseline were < 3 (31.9%), 3 to < 6 (29.8%), and 6 to < 9 months (29.8%). Cognitive function at baseline was scored as a mean of 24.1 ± 4.7 points according to MMSE, and showed no marked change throughout the 6 months. Services used included ambulatory medical care (55.3%) and day services (31.9%) (Table 1). HR was provided by only a physical therapist (42.6%) or both a physical therapist and an occupational therapist (40.4%). The highest frequency of HR (the total provided by all therapists) was 4 to < 8 sessions/month (59.6%); sessions typically lasted 40 (61.7%) or 60 min (34.0%). Services provided for the participants included body functions and structures (range-of-motion exercises, muscle-strengthening exercises, and relaxation) (49.0%), as well as exercises and instruction relating to activities and participation (walking, position changes and transfer activities, and going out) (29.7%) (Table 2).

Significant differences among the three time points were observed in one-way analysis of variance for social life ($p = 0.006$), LSA ($p = 0.025$), FIM motor ($p = 0.022$), and FIM total score ($p = 0.049$). Multiple comparison revealed significant improvements for social life (baseline vs. 3 months, $p = 0.014$; baseline vs. 6 months, $p = 0.008$), LSA (baseline vs. 6 months, $p = 0.013$), FIM motor (baseline vs. 3 months, $p = 0.018$), and FIM total score (baseline vs. 3 months, $p = 0.031$) (Table 3).

The following describes the changes in respective items for the ICF and LSA. Significant differences among the three time points were observed in Friedman's test for "d910 community life" ($p = 0.007$), "d920 recreation and leisure" ($p = 0.001$), and "d930 religion and spirituality" ($p = 0.012$) in social life. Multiple comparison revealed a significant difference between scores at baseline and 3 months later in "d920 recreation and leisure" ($p = 0.032$). Specific activities in the recreation and leisure category include recreation during day services, reading, watching TV, driving with friends, and traveling to a hot spring with family members. Specific activities in the community life category include attending funerals, activities of neighborhood associations, and attending to visitors. Specific activities in the religion and spirituality category include chanting sutras, praying at a family altar, and going to a temple (Table 4).

For the life-space levels of LSA, significant differences in scores among the three time points were observed in Friedman's test in level 2 (outside home; $p = 0.004$) and level 3 (neighborhood; $p = 0.042$). Multiple comparison showed no significant differences, but both levels scored the highest at 6 months (Table 5).

Regarding the frequency of travel in level 2 (outside home), the numbers of individuals with "no travel" (-4 participants) and travel "1 to 3 times/week" (-2) showed reductions, while the number with travel "daily" ($+6$) showed an increase after 6 months. Individually, 18 participants (38.3%) showed increases in this frequency. At level 3 (neighborhood), the numbers

Table 1. Baseline characteristics of the participants (n=47)

		N	%
Gender	Male	27	57.4
	Female	20	42.6
Age (mean ± SD)		76.7 ± 11.1	
Main disease	Cerebrovascular disease	14	29.8
	Osteoarticular disorder	11	23.4
	Spinal cord disorder	9	19.1
	Respiratory disease	4	8.5
	Others	9	19.1
Period from the onset or injury (months)	<3	2	4.3
	3 to <6	10	21.3
	6 to <9	12	25.5
	9 to <12	23	48.9
Period from the start of home rehabilitation (months)	<3	15	31.9
	3 to <6	14	29.8
	6 to <9	14	29.8
	9 to <12	4	8.5
MMSE (mean ± SD)	Baseline	24.1 ± 4.7	
	3 months	24.6 ± 5.2	
	6 months	24.0 ± 5.4	
Services used (multiple answers)	Outpatient clinic	26	55.3
	Day service	15	31.9
	Day care	3	6.4
	Visiting clinic	10	21.3
	Home nursing care	14	29.8
	Home care	17	36.2
Primary family caregiver (n=39) (no family caregiver N=8)			
Age (mean ± SD)		66.8 ± 12.3	
Relationship (wife/daughter/husband/others)		15/6/4/14	

SD: standard deviation; MMSE: Mini-Mental State Examination.

with “no travel” (−6) and travel “1 to 3 times/week” (−5) showed reductions, while the numbers with “<1/week” (+6) and “daily” (+4) showed increases. Individually, 20 participants (42.6%) showed increases in this frequency (Table 6).

Regarding their farthest trips, 72.4% of participants were in the category of level 4 (town; 21.3%) and level 5 (outside town; 51.1%) at baseline, while 89.4% of them were in these two levels at the survey after 6 months, at 36.2% and 53.2%, respectively (Table 7).

Significant differences among the three time points were observed in Friedman’s test for dressing activity (lower-body clothing) ($p=0.044$), toileting ($p=0.007$), toilet transfer ($p=0.046$), tub/shower transfer ($p=0.021$), and walking and wheelchair locomotion ($p=0.001$). Although multiple comparison revealed no significant differences, these activities improved at 3 months after baseline, after which such improvements tended to be maintained (Table 8).

DISCUSSION

The present study showed that we were able to measure changes in social participation of HR users within 1 year of stroke or other diseases by using the performance qualifiers of the ICF and LSA. The HR users started to perform community activities and recreational activities. Their frequency of movement to the neighborhood also increased. Their mobility and basic ADL improved, which is similar to findings in previous studies¹³.

From the results of the ICF, we demonstrated that the “community life” of HR users can change. Among conventional scales for measuring social participation, Frenchay Activities Index (FAI)³⁸, Nottingham Extended ADL Scale³⁹, London Handicap Scale⁴⁰, Extended Katz Index⁴¹, and Lawton Instrument ADL⁴² do not contain any items on “community life.” We were able to identify changes in the social participation of HR users by using the performance qualifier of the activities and participation components “Chapter 9 community, social and civic life” of the ICF. The ICF, a classification of human functioning and disorders²⁷, provides conceptual frameworks for respective domains but is not limited to specific items of

Table 2. Description of home-based rehabilitation (n=47)

		N (%)		
Therapist	PT	20 (42.6)		
	PT-OT	19 (40.4)		
	OT	5 (10.6)		
	PT-ST or PT-OT-ST	3 (6.4)		
Frequency (sessions/month)	2	1 (2.1)		
	4 to <8	28 (59.6)		
	8 to <12	14 (29.8)		
	12	4 (8.5)		
Time (minutes/session)	40	29 (61.7)		
	60	16 (34.0)		
	Others	2 (4.3)		
		Performed N (%)	Minutes/month (%) (total of all participants)	
			Subtotal	
Assessment and explanation		38 (80.9)	1,395 (10.4)	
Body functions and structures			6,606 (49.0)	
Range of motion exercise		45 (95.7)	2,055	
Muscle strengthening exercise		43 (91.5)	2,146	
Relaxation		36 (76.6)	1,620	
Respiratory therapy		9 (19.1)	240	
Dysphagia therapy		2 (4.3)	60	
Aphasia/dysarthria therapy		3 (6.4)	130	
Others (endurance, cognitive function)		9 (19.1)	355	
Activities and participation			4,005 (29.7)	
Sitting and transfer		22 (46.8)	675	
Standing and balance		8 (17.0)	280	
Walking		39 (83.0)	1,445	
Stair climbing		3 (6.4)	60	
Eating		1 (2.1)	10	
Toileting		12 (25.5)	280	
Bathing		6 (12.8)	90	
Dressing and grooming		4 (8.5)	100	
Communication		3 (6.4)	135	
Household tasks		3 (6.4)	70	
Moving around outside		16 (34.0)	620	
Recreation and leisure		4 (8.5)	200	
Interpersonal interactions		1 (2.1)	40	
Environmental factors			870 (6.5)	
Orthosis and devices		20 (42.6)	395	
Living environment adjustment		9 (19.1)	150	
Instruction on how to assist		18 (38.3)	320	
Others		2 (4.3)	5	
Others (conference, coordination with other organizations, caregiver support)			600 (4.4)	
		Total	13,476	13,476 (100)

PT: Physical therapist; OT: Occupational therapist; ST: Speech therapist.

activities, which allows for the evaluation of diverse activities for various individuals. The performance qualifier for activities and participation was reported to have low test-retest reliability⁴³). In the present study, we described definitions and specific examples of respective domains in the questionnaire and provided a remark column for activities specific to certain

Table 3. The change of measurements in 6 months (n=47)

	Baseline	3 months	6 months	One-way analysis of variance p-value
Domestic life	18.7 ± 6.1	17.8 ± 6.1	17.9 ± 6.1	0.252
Community, social, and civic life	15.8 ± 4.6	14.3 ± 4.9*	14.2 ± 5.1**	0.006**
LSA	25.2 ± 18.0	27.8 ± 16.5	30.2 ± 19.7*	0.025*
FIM motor	66.1 ± 17.3	69.1 ± 15.3*	68.6 ± 18.0	0.022*
FIM cognitive	28.4 ± 7.1	28.8 ± 7.2	28.2 ± 7.7	0.431
FIM total	94.4 ± 21.5	97.9 ± 19.7*	96.8 ± 23.2	0.049*

Mean ± SD, *p<0.05, **p<0.01.

FIM: Functional Independence Measure; LSA: Life-Space Assessment.

Table 4. The change by each item of “community, social, and civic life” (n=47)

	Baseline	3 months	6 months	Friedman’s test p-value
d910 Community life†	3.7 ± 0.9	3.2 ± 1.2	3.2 ± 1.2	0.007**
d920 Recreation and leisure‡	3.0 ± 1.5	2.4 ± 1.4*	2.5 ± 1.5	0.000**
d930 Religion and spirituality##	3.6 ± 1.0	3.5 ± 1.1	3.2 ± 1.3	0.012*
d940 Human rights	2.5 ± 1.6	2.3 ± 1.6	2.4 ± 1.6	0.291
d950 Political life and citizenship	3.1 ± 1.3	3.0 ± 1.3	2.9 ± 1.4	0.748

Mean ± SD, *p<0.05, **p<0.01.

†Community life: Attending funerals, Activities of neighborhood associations, Attending to visitors, Attending grand-children’s matriculation ceremony, Going to day services.

‡Recreation and leisure: Recreation during day services, Reading, Watching TV, Driving with friends, Traveling to a hot spring with family members, Shopping, Walking outside, Visiting a neighbor’s home, Cherry blossom viewing with family members, Going to a festival, Going to a concert.

##Religion and spirituality: Chanting sutras, Praying at a family altar, Going to a temple, Going to church, Visiting a shrine on New Year’s Day.

Table 5. The change of score by each life-space level (n=47)

Life-space level	Baseline	3 months	6 months	Friedman’s test p-value
Level 1: Home (0–8 points)	6.0 ± 1.5	5.8 ± 1.9	5.7 ± 1.9	0.072
Level 2: Outside home (0–16 points)	5.0 ± 4.1	5.9 ± 4.3	6.3 ± 4.9	0.004**
Level 3: Neighborhood (0–24 points)	5.1 ± 5.2	5.7 ± 5.8	7.1 ± 6.9	0.042*
Level 4: Town (0–32 points)	4.6 ± 5.2	5.2 ± 4.4	6.2 ± 5.6	0.145
Level 5: Outside town (0–40 points)	4.5 ± 6.3	5.3 ± 5.2	4.8 ± 5.9	0.509

Mean ± SD, *p<0.05, **p<0.01.

participants.

To survey activities in domestic life, we also used the performance qualifier for Chapter 6 domestic life of activities and participation of ICF, although the total score did not change. Similarly, no significant change was observed in previous studies using FAI¹³⁾ or Nottingham Extended ADL scale⁴⁴⁾. In the present study, many participants had their family members as their principal caregivers, suggesting that the caregivers assumed housekeeping responsibilities, thus relieving the participants of these responsibilities.

In the present study, HR users showed low LSA scores but improvements in their scores after 6 months. Fairhall et al.³¹⁾ showed that, during the natural course of activities of community-residing elderly people, LSA score decreased by 6.7 points from a mean of 62.9 to 56.2 after 6 months, suggesting that LSA scores for activities of the elderly may naturally decrease with aging. Therefore, the increase of the mean LSA score by 5 from 25.2 to 30.2 points after 6 months in HR users may have been due to the effect of HR itself.

The improvement in LSA score after 6 months was accounted for mainly by the increase in the frequency of travel to outside the home (life-space level 2) and neighborhood (level 3). On the other hand, the farthest trip of participants tended to fall predominantly into the categories of town (level 4) or outside town (level 5) already at baseline. Similar tendencies

Table 6. The change in frequency of travel outside the home (level 2) and to the neighborhood (level 3) (n=47) N (%)

	Frequency	Base line	3 months	6 months	6-month change*	
Level 2 outside home	No (A)	8 (17.0)	2 (4.3)	4 (8.5)	-4	
	<1/week (B)	8 (17.0)	12 (25.5)	9 (19.1)	+1	
	1-3 times/week (C)	19 (40.4)	19 (40.4)	17 (36.2)	-2	
	4-6 times/week (D)	6 (12.8)	5 (10.6)	5 (10.6)	-1	
	Daily (E)	6 (12.8)	9 (19.1)	12 (25.5)	+6	
	Individual change in frequency (baseline → 6 months)					
	Increase 18 (38.3) (A→B 3, A→C 2, A→D 1, B→C 2, B→D 1, C→D 2, C→E 4, D→E 3)					
	No change 22 (46.8) (A→A 2, B→B 3, C→C 11, D→D 1, E→E 5)					
	Decrease 7 (14.9) (B→A 2, C→B 2, D→B 1, D→C 1, E→C 1)					
	Level 3 neighborhood	No (A)	15 (31.9)	12 (25.5)	9 (19.1)	-6
<1/week (B)		9 (19.1)	11 (23.4)	15 (31.9)	+6	
1-3 times/week (C)		16 (34.0)	17 (36.2)	11 (23.4)	-5	
4-6 times/week (D)		4 (8.5)	4 (8.5)	5 (10.6)	+1	
Daily (E)		3 (6.4)	3 (6.4)	7 (14.9)	+4	
Individual change in frequency (baseline → 6 months)						
Increase 20 (42.6) (A→B 7, A→C 1, A→D 1, B→C 4, C→D 3, C→E 4)						
No change 17 (36.2) (A→A 6, B→B 3, C→C 4, D→D 1, E→E 3)						
Decrease 10 (21.3) (B→A 2, C→B 4, C→A 1, D→B 1, D→C 2)						

*The number of participants at 6 months minus the baseline number of participants.

Table 7. The change in farthest trip (n=47) N (%)

Life-space level	Baseline	3 months	6 months	6-month change*
Level 1: Home	5 (10.6)	2 (4.3)	2 (4.3)	-3
Level 2: Outside home	4 (8.5)	1 (2.1)	2 (4.3)	-2
Level 3: Neighborhood	4 (8.5)	3 (6.4)	1 (2.1)	-3
Level 4: Town	10 (21.3)	11 (23.4)	17 (36.2)	+7
Level 5: Outside town	24 (51.1)	30 (63.8)	25 (53.2)	+1
Individual change in frequency (baseline → 6 months)				
Increase 15 (31.9) (Level 1→Level 5: 2, Level 1→Level 3: 1, Level 2→Level 5: 2, Level 3→Level 4: 4, Level 4→Level 5: 6)				
No change 23 (48.9) (Level 1→Level 1: 2, Level 2 →Level 2: 2, Level 4→Level 4: 4, Level 5 →Level 5: 15)				
Decrease 9 (19.2) (Level 5→Level 4: 9)				

*Number of participants at 6 months minus baseline number of participants.

were observed in other studies in community residents aged 65 or older³¹⁾ and users of preventive healthcare services³⁷⁾. We enrolled HR users in this study, many of whom used an ambulatory care service or day service; therefore, although the frequency of travel was rather low, the farthest trip was maintained at a high level.

Low LSA scores have been reported in community residents aged 65 or older (with a mean age of 75.0 years old, including 46% not independent regarding their ADL), whose scores decreased from 62.9 at baseline to 56.2 after 6 months³¹⁾. In addition, home-residing individuals with spatial agnosia who had been affected by stroke (with a mean age of 60.0 years old) and used in-hospital rehabilitation during the subacute period scored a mean of 49.6, among whom individuals with severe spatial agnosia scored a mean of 33.7 points³²⁾. Although we cannot directly compare these results with ours in HR users, our participants were all dependent regarding their ADL, with a rather high mean age of 76.7 years old, which suggests that the LSA score in the present study may reflect the participants' narrow range of mobility.

Our participants were involved in activities of neighborhood associations and ceremonial occasions. They also performed various activities, for example, driving with friends, traveling to a hot spring, and praying at a family altar. To achieve these activities, adjustments to environmental barriers and support from caregivers are required. HR provides services in the actual living environment, which explains why it can provide effective intervention for these social activities.

Limitations of this study include that it was a prospective cohort study. There was also no control group in this study, so it was not clear how effective the HR was. However, it was suggested that continuous HR could improve social participation

Table 8. The change by each item of FIM motor (n=47)

Item (each item 1–7 points)	Baseline	3 months	6 months	Friedman's test p-value
Self-care				
Eating	6.3 ± 1.3	6.4 ± 1.1	6.3 ± 1.2	0.273
Grooming	5.8 ± 1.6	5.8 ± 1.5	6.0 ± 1.5	0.126
Bathing	4.0 ± 2.1	4.0 ± 2.2	4.1 ± 2.3	0.642
Dressing, upper body	4.7 ± 2.0	5.1 ± 1.8	5.0 ± 2.1	0.131
Dressing, lower body	4.7 ± 2.1	4.9 ± 1.9	4.9 ± 2.2	0.044*
Toileting	5.2 ± 1.9	5.7±1.6	5.6 ± 1.9	0.007**
Sphincter control				
Bladder management	6.1 ± 1.7	6.2 ± 1.5	5.9 ± 2.0	0.479
Bowel management	6.1 ± 1.7	6.2 ± 1.5	6.0 ± 1.8	0.423
Transfer				
Bed, chair, wheelchair	5.9 ± 1.3	6.1 ± 1.1	5.9 ± 1.5	0.152
Toilet	5.8 ± 1.4	6.1 ± 1.2	5.9 ± 1.5	0.046*
Tub or shower	3.9 ± 1.8	4.1 ± 1.9	4.3 ± 1.7	0.021*
Locomotion				
Walk, wheelchair	5.1 ± 1.8	5.6 ± 1.3	5.6 ± 1.4	0.001**
Stairs	2.5 ± 2.1	2.9 ± 2.2	3.0 ± 2.2	0.130

Mean ± SD, *p<0.05, **p<0.01.

and life-space mobility for community-dwelling elderly disabled within 1 year of stroke or other diseases. The HR provided to our participants was typical for Japan in terms of frequency, the specific profession of the healthcare staff visiting the users' home, and the services provided⁴⁵). Meanwhile, regarding the number of hours of the program provided to all participants, 49% of the time was devoted to body functions and structures, including range-of-motion exercises and muscle-strengthening exercises, while 29.7% was for participation and activities. In addition, about 60% of participants were engaged in HR at a frequency as low as 4 to <8 sessions/month. By increasing the frequency of sessions as needed and thereby increasing the hours of HR provided, more hours can be devoted to basic ADL, social life, and hobbies, which may further increase the effectiveness of HR.

Conflict of interest

There are no conflicts of interest in this study.

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