

# Effect of home-based reablement program on improving activities of daily living for patients with stroke

## A pilot study

Der-Sheng Han, MD, PhD<sup>a,b,c</sup>, Po-Wen Chuang, MS<sup>d</sup>, En-Chi Chiu, OTD, PhD<sup>e,\*</sup> 

### Abstract

**Background:** Administering activities of daily living (ADL) and recovery of ADL functions are the main treatment goals in rehabilitation for patients with stroke. Reablement is one form of rehabilitative intervention, which aims to restore ADL functions performed in the community. The purpose of this study was to investigate the effects of home-based reablement from 3 concepts of ADL (ie, actual performance, ability, and self-perceived difficulty) for patients with stroke.

**Methods:** This was a single-blind pilot randomized clinical trial. Twenty-six patients were randomly assigned into 2 groups: home-based reablement group (n = 12) and control group (n = 14). The home-based reablement group received ADL training in the home environment for 6 weeks. The control group received conventional rehabilitation in the hospital. Outcome measures contained the Canadian Occupational Performance Measure (COPM) and the Barthel Index-based Supplementary Scales (BI-SS). The COPM was applied to identify patients' level of performance and satisfaction with ADL training. The BI-SS included 3 ADL scales: actual performance, ability, and self-perceived difficulty.

**Results:** The patients in the home-based reablement group showed statistically significant improvements in the ability scale and total score of the BI-SS than the control group ( $P < .05$ ) and demonstrated moderate effect size (success rate difference = 0.34–0.42). No significant differences were noticed in the COPM and the other 2 scales of the BI-SS (actual performance and self-perceived difficulty), but small effect sizes were found (success rate difference = 0.17–0.22).

**Conclusions:** For patients with stroke, the 6-week home-based reablement program had similar effects with the control group on patients' perceived performance, satisfaction, and difficulty in ADL, but it displayed potential for enhancing their ability in executing ADL tasks.

**Abbreviations:** ADL = activities of daily living, BI-SS = Barthel index-based supplementary scales, COPM = Canadian occupational performance measure, MDC = minimal detectable change.

**Keywords:** activities of daily living, rehabilitation, stroke

Editor: Manal Kamel Youssef.

DH and PC contributed equally to this work.

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

This study was financially supported by the Ministry of Science and Technology, Taiwan (grant no. MOST 107-2314-B-227-008-MY3).

The authors have no conflicts of interest to disclose.

Supplemental Digital Content is available for this article.

<sup>a</sup>Department of Physical Medicine and Rehabilitation, National Taiwan University Hospital, Bei-Hu Branch, <sup>b</sup>Department of Physical Medicine and Rehabilitation, National Taiwan University College of Medicine, <sup>c</sup>Health Science and Wellness Center, National Taiwan University, <sup>d</sup>Taipei Private YoHsiang Long Term Care Institution, <sup>e</sup>Department of Long-Term Care, National Taipei University of Nursing and Health Sciences, Taipei, Taiwan.

\*Correspondence: En-Chi Chiu, No. 83-1, Nei-Chiang Street, Wan-Hwa District, Taipei 10845, Taiwan (e-mail: enchichiu@ntunhs.edu.tw).

Copyright © 2020 the Author(s). Published by Wolters Kluwer Health, Inc. This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial License 4.0 (CCBY-NC), where it is permissible to download, share, remix, transform, and buildup the work provided it is properly cited. The work cannot be used commercially without permission from the journal.

How to cite this article: Han DS, Chuang PW, Chiu EC. Effect of home-based reablement program on improving activities of daily living for patients with stroke: a pilot study. *Medicine* 2020;99:49(e23512).

Received: 14 July 2020 / Received in final form: 30 October 2020 / Accepted: 4 November 2020

<http://dx.doi.org/10.1097/MD.00000000000023512>

## 1. Introduction

Stroke survivors suffer varying degrees of impairment in their physical functions, which result in severe life changes that impact their performance of activities of daily living (ADL). About 65% of patients with stroke experience ADL disabilities.<sup>[1]</sup> Stroke affects their psychological and social functioning, which causes ADL dependency, changes in emotional and psychological states, and social withdrawal, thereby resulting in reduced quality of life.<sup>[2,3]</sup> Thus, ADL trainings in the real situations (eg, home environment) are needed to increase patients' independence in ADL in daily life.

Reablement (also known as restorative care) is one form of rehabilitative intervention to support older people in retraining and retaining independent ADL in the community.<sup>[4]</sup> Reablement is a short-term home-based intervention (eg, 6–12 weeks), which emphasizes intensive, multidisciplinary, and goal-directed rehabilitation for people at risk of functional degradation or having needs of rehabilitation. It is a person-centered approach based on personal participation and resources.<sup>[5]</sup> Reablement has been implemented in a number of countries in response to the increase in aging populations with long-term conditions who prefer to stay in their homes and community settings.<sup>[4,6,7]</sup> There is evidence supporting that the reablement intervention leads to significant improvements in ADL for older adults.<sup>[8–10]</sup> However,

evidence on the effectiveness of reablement for patients with stroke is limited.

ADL consists of 3 main concepts: actual performance, ability, and self-perceived difficulty. Actual performance refers to the patient's independence or dependence in performing ADL. Ability refers to patients' capability or incapability to perform ADL. Self-perceived difficulty refers to the patient's subjective perception of the degree of difficulty in performing ADL.<sup>[11]</sup> All 3 concepts of ADL should be measured to comprehensively understand the effectiveness of home-based interventions on ADL for patients with stroke. However, most of the past studies on home-based interventions adopted only the measures of actual performance (eg, the Barthel Index),<sup>[12–14]</sup> leaving the effectiveness of the other 2 aspects unknown. Therefore, the aim of this preliminary study was to investigate the effects of reablement in patients with stroke from the 3 concepts of ADL (ie, actual performance, ability, and self-perceived difficulty).

## 2. Methods

### 2.1. Participants

A convenience sample was recruited in 1 hospital between February and September 2018. The inclusion criteria were:

- (1) diagnosis of stroke;
- (2) age above 20;
- (3) able to understand instructions and follow them;
- (4) score of 2 to 4 on the modified Rankin Scale; and
- (5) willing to participate in the study with informed consent.

Exclusion criteria were:

- (1) progressive disease (eg, dementia and Parkinsonism)
- (2) orthopedic disorder (eg, joint deformation); and
- (3) peripheral nerve injury.

The study protocol was approved by the Institutional Review Board of the local hospital (201712067RIND) and was registered in ClinicalTrials.gov (NCT03828851).

### 2.2. Procedures

This study was a single-blind pilot randomized clinical trial. Participants who met the inclusion criteria were randomly assigned into 2 groups: home-based reablement group and control group. The allocation sequence was generated through the random table in Excel by the second author who was not involved in assessing participants. The participants were assessed by 2 independent occupational therapists who were blinded to the participants' allocations. The 2 examiners completed at least 4 hours of training to become familiar with the procedures for the measures and scoring criteria. Each participant was interviewed using the Canadian Occupational Performance Measure (COPM) to identify 2–3 ADL tasks which were difficult for them to perform. Outcome measures (the COPM and the BI-based Supplementary Scales [BI-SS]) were administered at baseline and after the 6-week program at participants' home. The home-based reablement group received 6 weeks of ADL training in their home environment by the second author. The control group received a conventional rehabilitation program in the hospital. The conventional rehabilitation program included 30 minutes of occupational therapy and 30 minutes of physical therapy for training motor and cognitive functions, twice a week.

### 2.3. Intervention

Patients in the home-based reablement group received a home program (Appendix A, <http://links.lww.com/MD/F313>) consisting of ADL tasks, 50 minutes each time, once a week for 6 weeks administered by 1 occupational therapist who did not administer the outcome measures. In the first week, the occupational therapist who administered the home program confirmed the 2 to 3 ADL tasks that patients perceived as important, realized the difficulties in performing those ADL tasks, and affirmed the level of improvement that patients wanted to achieve. Moreover, the occupational therapist observed the patients to understand their recent performance on the ADL tasks. In the second week, patients were administered with ADL training. For the ADL tasks that were more difficult, the occupational therapist provided the patients with strategies for conducting those tasks. In the third to sixth weeks, patients were administered with ADL training and if needed, the occupational therapist provided different strategies for conducting the various ADL tasks.

### 2.4. Outcome measures

The COPM measures patients' outcomes in 3 areas: self-care, productivity, and leisure.<sup>[15]</sup> The COPM is conducted using a semi-structured interview. In this study, the COPM was applied to understand patients' perceptions on 2 to 3 ADL tasks that they wanted to engage on. Patients rated the 2 to 3 ADL tasks to identify the level of performance and level of satisfaction on a scale of 1 to 10. Higher scores indicated better performance or satisfaction as perceived by patients. The COPM has acceptable test-retest reliability and divergent validity in patients with stroke.<sup>[16]</sup>

The BI-SS measures ADL using 3 scales: actual performance, ability, and self-perceived difficulty. The actual performance scale is the original Barthel Index for assessing degree of actual doing ADL in the daily environment. The ability scale assesses ability of executing ADL tasks in a standardized and controlled context. The self-perceived difficulty scale assesses the level of difficulty that patients perceive in doing ADL without help in daily life.<sup>[11]</sup> The 2 scales (actual performance and self-perceived difficulty) contains 10 items: feeding, grooming, dressing, bathing, bowel control, bladder control, toileting, transferring, ambulation, and stairs climbing. The ability scale includes 8 items: feeding, grooming, dressing, bathing, toileting, transferring, ambulation, and stair climbing. Items in these 3 scales are rated as 2-points (0–1), 3-points (0–1–2), or 4-points (0–1–2–3). The scores for the actual performance, ability, and self-perceived difficulty scales are 0 to 20, 0 to 18, and 0 to 20, respectively. A higher score on the actual performance scale demonstrates more independence in ADL. A higher score on the ability scale displays greater level of ability to execute ADL. A higher score on the self-perceived difficulty scale indicates lower self-perceived difficulty in ADL. The total score of the BI-SS ranges from 0 to 68. The BI-SS has been shown to have satisfactory test-retest reliability, construct validity, and responsiveness in patients with stroke.<sup>[11,17]</sup>

### 2.5. Statistical analysis

We adopted non-parametric statistical methods because of the small sample size in this study. The Chi-square test and Mann-Whitney *U* test were used to compare the baseline characteristics (categorical variables and continuous variables, respectively)

between the home-based reablement group and control group. We conducted intention-to treat analysis in this study, in which we used baseline scores to deal with the missing data. Change scores were estimated between 2 assessments at baseline and after 6 weeks. The Mann-Whitney *U* test was used to examine the differences in score changes of the COPM and BI-SS between the home-based reablement group and control group (2-tailed,  $\alpha = 0.05$ ). The effect size for nonparametric statistics, success rate difference (SRD), was estimated. The criteria of the SRD were:  $>0.43$ , large effect size;  $0.28$  to  $0.43$ , moderate effect size; and  $0.11$  to  $0.27$ , small effect size.<sup>[4]</sup> The Wilcoxon signed ranks test was applied to compare the COPM and BI-SS between the pre- and post-assessments for each group.

We also analyzed the proportion of minimal detectable change (MDC) for the 3 scales of the BI-SS between the home-based reablement group and control group. The MDC proportion is the proportion of patients' score change higher than the MDC values of the 3 scales. The MDC values of the actual performance, ability, and self-perceived scales are 4.3, 1.9, and 5.5, respectively.<sup>[17,18]</sup>

Due to the lack of studies on ADL training from the 3 concepts of ADL in patients with stroke, we did not perform a power estimation to calculate the sample size. We chose a sample size of 12 per group, which is rule of thumb for a pilot study.<sup>[19,20]</sup>

### 3. Results

Figure 1 displays the flow chart of the patients' enrollment in this study. Forty-two eligible patients with stroke were referred by a rehabilitation physician. Of these, 16 patients were excluded, including 13 patients who declined participation in this study and 3 patients who declined administration of the assessments. Twenty-six patients provided informed consent and were randomly assigned to the home-based reablement group ( $n = 12$ ) and control group ( $n = 14$ ). Two patients in the control group dropped out because they were unwilling to carry out post-assessments. Following the principle of intention-to-treat, 12 and 14 participants (in the home-based reablement group and control group, respectively) were included in the statistical analysis of this study. The demographic information and clinical characteristics of the participants are shown in Table 1. No statistically significant differences ( $P < .05$ ) between the 2 groups were noticed in terms of age, gender, education, stroke type, time since onset, affected hemisphere, and modified Rankin Scale score.

No statistically significant differences were found in the comparison of baseline scores of the COPM and BI-SS between the 2 groups (Table 2). The change scores of the COPM (performance and satisfaction) between the 2 groups showed no statistically significant differences ( $P = .065$ – $.083$ ) with small effect sizes (SRD =  $0.22$  and  $0.17$ , respectively). Regarding the BI-SS, the change scores of the ability scale and total score revealed statistically significant differences ( $P = .0026$  and  $.004$ , respectively) and moderate effect sizes (SRD =  $0.34$  and  $0.42$ , respectively). The differences in the change scores of the other 2 scales were not statistically significant. The SRD of the actual performance and self-perceived difficulty scale were both  $0.22$  (small effect size).

The results of the Wilcoxon signed ranks test showed statistically significant differences in the COPM (performance and satisfaction) ( $P = .011$ – $.024$ ) (Table 2), the 2 scales of the BI-SS (ability and self-perceived) ( $P = .0011$ – $.041$ ), and the total score of the BI-SS ( $P = .004$ ) in the home-based reablement group.

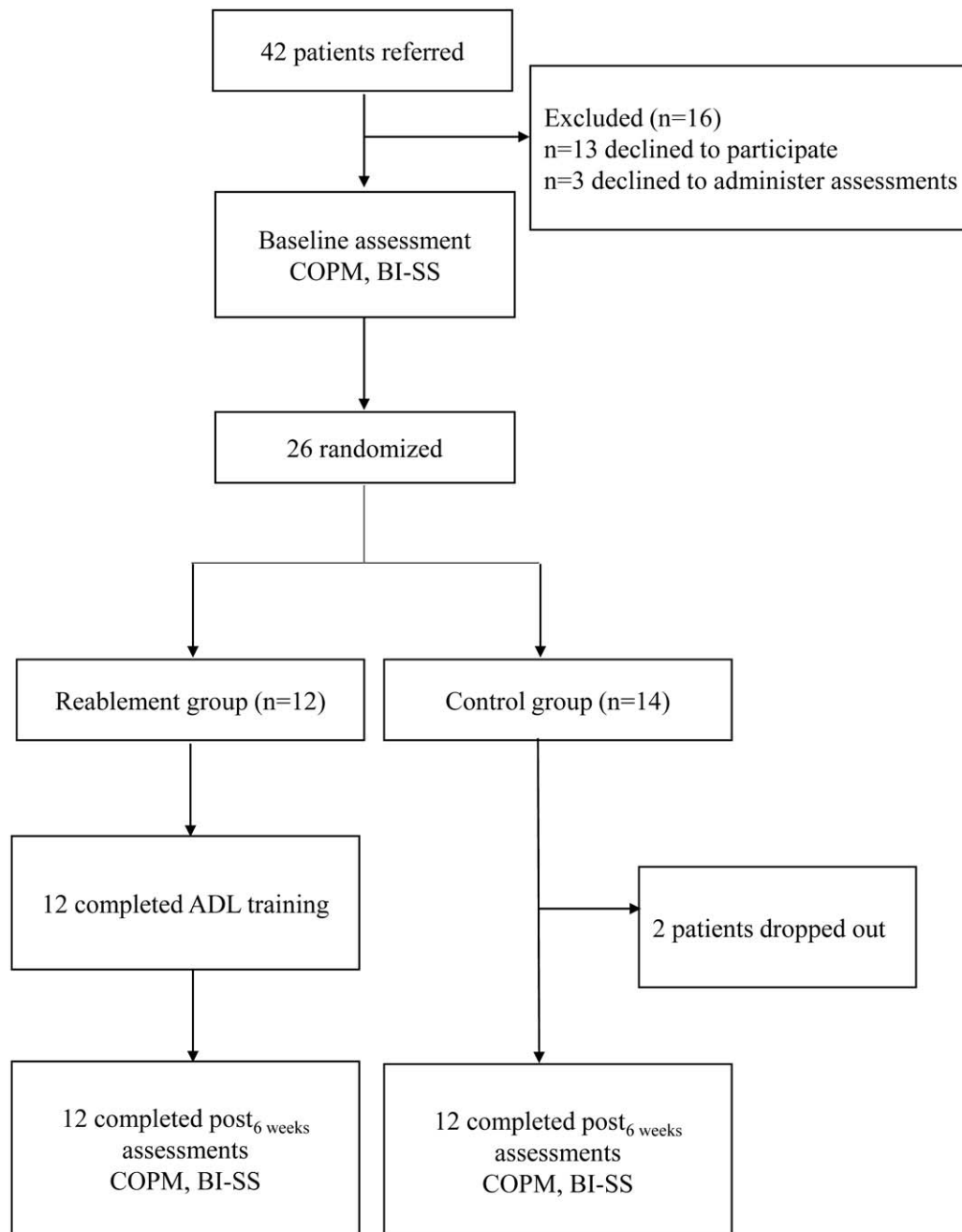
There were no statistically significant differences in the COPM and BI-SS for the participants in the control group ( $P > .05$ ).

In the home-based reablement group, 2 participants revealed score changes higher than the MDC values of 2 ADL scales in the BI-SS (ie, actual performance and self-perceived difficulty). Five participants displayed score changes greater than the MDC values of the ability scale in the BI-SS. In the home-based reablement group, the MDC proportions were 16.7%, 41.7%, and 16.7% in the actual performance, ability, and self-perceived difficulty scales, respectively. In the control group, no participants showed score changes higher than the MDC values in all ADL scales, except 1 participant who showed score changes greater than the MDC values of the ability scale. In the control group, the MDC proportions were 0%, 7.1%, and 0% in the actual performance, ability, and self-perceived difficulty scales, respectively.

### 4. Discussion

This study was conducted to compare stroke patients' ADL ability and their perceptions on ADL performance, satisfaction, and difficulty between the home-based reablement group and control group. There were no statistically significant differences between the home-based reablement group and control group on the level of performance and level of satisfaction in the COPM in this study. These findings mean that both interventions have similar effects on patients' perceived performances and satisfaction. The reason for these non-significant results may be attributable to the relatively high number of patients who expressed interest in functional mobility as their ADL training (ie, walking) for the 2 groups. Previous studies have stated that recovery of walking is one of the primary goals for patients with stroke.<sup>[21,22]</sup> In this study, the COPM was used to examine the 2 to 3 ADL tasks for engagement in training. Our results indicated that 96% (ie, 25 patients) of the total sample were concerned about their performance in walking. Patients with stroke typically carry out ambulation training in their routine rehabilitation at the hospital. Thus, no statistically significant differences were found between the home-based reablement and conventional rehabilitation groups.

Statistically significant differences in the level of performance and satisfaction were found between the pre- and post-assessments of the home-based reablement group, but no significant differences emerged for the control group. That is, the home-reablement group showed a treatment effect. Two possible reasons may explain why the change scores of the COPM were not significantly different between the two groups, while significant differences were found in the pre-post assessments in the home-based reablement group but not the control group. First, participants in the home-based reablement group received additional training on ADL tasks (eg, eating, dressing and undressing, showering, and using the toilet). In this study, we targeted ADL tasks that the participants perceived as important but had difficulty performing and the occupational therapist assisted participants in executing these ADL while adapting to their unique circumstances. Second, the home-reablement group appeared to have a better treatment effect with small effect size. The small effect size may result in large measurement error and the differences could not achieve the level of significance. Further studies with large sample sizes are needed to cross-validate the effects of the home-based reablement program.



**Figure 1.** Flowchart of patients' enrollment.

With regard to the results of the BI-SS, statistically significant differences in the ability scale and total score were noticed and moderate effect sizes were displayed between the 2 groups. In the ability scale and total score, statistically significant differences were found for participants in the home-based reablement group. The MDC proportion of the 3 scales (ie, actual performance, ability, and self-perceived) showed that patients with stroke in the home-based reablement group showed improvements in performing ADL tasks compared to those in the control group. However, the changes of the 3 ADL scales did not reach the MDC values for changes in the reablement group or changes between the 2 groups. According to these findings, home-based reable-

ment (ie, 6 consecutive weeks of ADL training) showed its potential for enhancing patients' capability in executing ADL tasks, lowering patients' perceived difficulty of ADL tasks, and increasing overall ADL function.

The actual performance scale assessed whether patients with stroke actually perform ADL in daily life. The ability scale assessed whether patients with stroke can perform ADL in a defined environment.<sup>[17]</sup> Two possible reasons may clarify why the change scores of the ability scale showed significant improvement, but not that of the actual performance scale. The first reason pertains to the constraints of the physical environment.<sup>[23,24]</sup> For instance, if the bathroom in the house is

**Table 1**  
Demographic information and clinical characteristics of participants.

Characteristic	Reablement (n = 12)	Control (n = 14)	P-value
Age (yr, mean ±SD)	70.8 ±6.5	65.4 ±16.7	.247
Gender, n (%)			.899
Male	8 (66.7)	9 (64.3)	
Female	4 (33.3)	5 (35.7)	
Education, n (%)			.965
Elementary school and below	3 (25.0)	3 (21.4)	
Middle school	1 (8.3)	2 (14.3)	
High school	3 (25.0)	3 (21.4)	
College and above	5 (41.7)	6 (42.9)	
Stroke type, n (%)			.484
Hemorrhagic	7 (58.3)	10 (71.4)	
Ischemic	5 (41.7)	4 (28.6)	
Time since onset (months, mean ±SD)	22.8 ±17.7	53.5 ±43.7	.117
Affected hemisphere, n (%)			.225
Left	8 (66.7)	6 (42.9)	
Right	4 (33.3)	8 (57.1)	
Modified Rankin Scale, n (%)			.867
Score of 3	10 (83.3)	12 (85.7)	
Score of 4	2 (16.7)	2 (14.3)	

SD = standard deviation.

not equipped with handrails, patients with stroke cannot actually go to toilet. The ability scale does not assess bowel control and bladder control due to the infeasibility of assessing this in a defined environment. The second reason pertains to cultural factors. Patients with stroke who participated in this study lived with caregivers. Although patients who received ADL training showed improvements in executing ADL, many ADL tasks were actually done with the assistance of their caregivers. Therefore, in addition to providing interventions that improve daily functioning, home-based professionals should also focus on overcoming environmental barriers and caregiver education to reduce assistance for patients with stroke, in order to improve their independence and ADL functioning.

For the self-perceived difficulty scale, a statistically significant difference for participants in the home-based reablement group was found. However, there were no significant differences

between the 2 groups. A possible reason for the lack of significant differences between the 2 groups could be due to the delayed awareness of their own difficulties in performing ADL tasks during ADL training.<sup>[2,3]</sup> For clinical application, strategies must be devised to resolve the difficulties experienced in their daily lives in order to decrease patients' self-perceived levels of difficulty.

Three limitations were noticed in this study. First, the sample size of this study was too small, thus we conducted the Mann-Whitney *U* test which is used to examine whether there are differences in the medians of 2 groups. Because of the outliers in the control group, the mean value of the time since onset in the control group was much longer than that in the home-based reablement group. Outliers have little effect on the median value,<sup>[2,5]</sup> so there was no significant difference between the 2 groups. Moreover, patients were recruited from 1 hospital, which limits the generalization of our findings. Further studies with

**Table 2**  
Descriptive and inferential statistics of outcome measures.

Outcome	Group	Baseline			Post <sub>6 weeks</sub> - baseline			Wilcoxon signed ranks test	
		mean ±SD	z value	P-value	mean ±SD	z value	P-value	z value	P-value
COPM									
Performance	Reablement	4.4 ±2.4	-0.438	.661	1.3 ±1.4	-1.734	.083	-2.550	.011*
	Control	4.2 ±1.8	-	-	0.2 ±2.0	-	-	-0.204	.838
Satisfaction	Reablement	4.2 ±2.4	-0.052	.959	1.3 ±1.7	-1.844	.065	-2.253	.024*
	Control	4.0 ±1.8	-	-	0.0 ±1.7	-	-	-0.153	.878
BI-SS									
Actual performance	Reablement	12.6 ±6.4	-0.905	.366	1.7 ±2.6	-1.879	.060	-1.955	.051
	Control	14.6 ±6.2	-	-	-0.2 ±1.7	-	-	-0.208	.835
Ability	Reablement	11.7 ±5.4	-0.465	.642	1.6 ±1.7	-2.223	.026*	-2.532	.011*
	Control	12.7 ±5.1	-	-	0.1 ±1.2	-	-	-0.159	.873
Self-perceived difficulty	Reablement	12.0 ±6.5	-0.414	.679	3.3 ±5.8	-1.494	.135	-2.047	.041*
	Control	13.1 ±6.4	-	-	0.4 ±2.0	-	-	-1.065	.287
Total score	Reablement	36.3 ±17.3	-0.592	.554	6.6 ±7.0	-2.858	.004*	-2.847	.004*
	Control	40.4 ±17.3	-	-	0.2 ±2.9	-	-	-1.077	.282

BI-SS = Barthel index-based supplementary scales, COPM = Canadian occupational performance measure.

\* Significant differences between groups (*P* < .05).

large sample sizes are warranted to administer home-based reablement programs in different communities. Second, we recruited patients with moderate to moderately severe disability (modified Rankin scale = 3–4). Patients with severe disability and slight disability were not included. Further studies including patients with different levels of disability are needed to investigate which patients at what level of disability benefit more from home-based reablement services. Third, the home-based program in this study was conducted once a week, for 6 weeks. Future studies could provide more intensive ADL programs (eg, 2 or 3 times a week) and longer periods (eg, 12 weeks) to examine the effects of different programs in patients with stroke.

## 5. Conclusions

The 6-week home-based reablement program had non-significant effects on patients' perceived performance, satisfaction, and difficulty in ADL. We found that patients with stroke showed potential to improve their ADL ability for the tasks that they were most concerned about. Future studies with large sample sizes are warranted.

## Author contributions

**Conceptualization:** En-Chi Chiu.

**Data curation:** Po-Wen Chuang.

**Formal analysis:** Po-Wen Chuang.

**Funding acquisition:** En-Chi Chiu.

**Investigation:** Der-Sheng Han, Po-Wen Chuang.

**Methodology:** En-Chi Chiu.

**Project administration:** Der-Sheng Han, Po-Wen Chuang.

**Resources:** Der-Sheng Han.

**Supervision:** En-Chi Chiu.

**Writing – original draft:** Po-Wen Chuang, En-Chi Chiu.

**Writing – review and editing:** Der-Sheng Han, En-Chi Chiu.

## References

- [1] Haghgoo HA, Pazuki ES, Hosseini AS, et al. Depression, activities of daily living and quality of life in patients with stroke. *J Neurol Sci* 2013;328:87–91.
- [2] Whyte EM, Mulsant BH. Post stroke depression: epidemiology, pathophysiology, and biological treatment. *Biol Psychiatry* 2002;52:253–64.
- [3] Clarke PJ, Lawrence JM, Black SE. Changes in quality of life over the first year after stroke: findings from the Sunnybrook Stroke Study. *J Stroke Cerebrovasc Dis* 2000;9:121–7.
- [4] Aspinall F, Glasby J, Rostgaard T, et al. New horizons: reablement-supporting older people towards independence. *Age Ageing* 2016;45:574–8.
- [5] Hjelle KM, Tuntland H, Forland O, et al. Driving forces for home-based reablement; a qualitative study of older adults' experiences. *Health Soc Care Community* 2017;25:1581–9.
- [6] Tuntland H, Kjekken I, Langeland E, et al. Predictors of outcomes following reablement in community-dwelling older adults. *Clin Interv Aging* 2017;12:55–63.
- [7] Wang Y, Liu L. The effect of reablement in long-term care facilities in Taiwan. *Innov Aging* 2018;2:539.
- [8] Tuntland H, Aaslund MK, Espehaug B, et al. Reablement in community-dwelling older adults: a randomised controlled trial. *BMC Geriatr* 2015;15:145.
- [9] Lewin G, Vandermeulen S. A non-randomised controlled trial of the Home Independence Program (HIP): an Australian restorative programme for older home-care clients. *Health Soc Care Community* 2010;18:91–9.
- [10] Winkel A, Langberg H, Waehrens EE. Reablement in a community setting. *Disabil Rehabil* 2015;37:1347–52.
- [11] Lee YC, Chen SS, Koh CL, et al. Development of two Barthel Index-based Supplementary Scales for patients with stroke. *PLoS One* 2014;9:e110494.
- [12] Avila A, Duran M, Peralbo M, et al. Effectiveness of an occupational therapy home programme in Spain for people affected by stroke. *Occup Ther Int* 2015;22:1–9.
- [13] Gilbertson L, Langhorne P, Walker A, et al. Domiciliary occupational therapy for patients with stroke discharged from hospital: randomised controlled trial. *BMJ* 2000;320:603–6.
- [14] Ng S, Chu M, Wu A, et al. Effectiveness of home-based occupational therapy for early discharged patients with stroke. *Hong Kong J Occup Ther* 2005;15:27–36.
- [15] Mercier L, Audet T, Hebert R, et al. Impact of motor, cognitive, and perceptual disorders on ability to perform activities of daily living after stroke. *Stroke* 2001;32:2602–8.
- [16] Lopez-Liria R, Vega-Ramirez FA, Rocamora-Perez P, et al. Comparison of two post-stroke rehabilitation programs: a follow-up study among primary versus specialized health care. *PLoS One* 2016;11:e0166242.
- [17] Lee YC, Yu WH, Hsueh IP, et al. Test-retest reliability and responsiveness of the Barthel Index-based Supplementary Scales in patients with stroke. *Eur J Phys Rehabil Med* 2017;53:710–8.
- [18] Lu W-S, Lee Y-C, Twu F-C, et al. Minimal detectable change and responsiveness of the 5-item Barthel Index in patients with stroke Taiwan. *J Phys Med Rehabil* 2013;41:113–9.
- [19] van Belle G. *Statistical Rules of Thumb*. New York: John Wiley; 2002.
- [20] Julious SA. Sample size of 12 per group rule of thumb for a pilot study. *Pharm Stat* 2005;4:287–91.
- [21] Jang SH. The recovery of walking in stroke patients: a review. *Int J Rehabil Res* 2010;33:285–9.
- [22] Balasubramanian CK, Clark DJ, Fox EJ. Walking adaptability after a stroke and its assessment in clinical settings. *Stroke Res Treat* 2014;2014:591013.
- [23] Bertilsson AS, Ranner M, von Koch L, et al. A client-centred ADL intervention: three-month follow-up of a randomized controlled trial. *Scand J Occup Ther* 2014;21:377–91.
- [24] Thorsen AM, Holmqvist LW, de Pedro-Cuesta J, et al. A randomized controlled trial of early supported discharge and continued rehabilitation at home after stroke: five-year follow-up of patient outcome. *Stroke* 2005;36:297–303.
- [25] Cousineau D, Chartier S. Outliers detection and treatment: a review. *Int J Psychol Res* 2010;3:58–67.