Economic Evaluation of an Enhanced Post-Discharge Home-Based Care Program for Stroke Survivors

Abstract

Objectives

To examine the cost-effectiveness of an enhanced postdischarge home-based care program for stroke survivors compared with usual care.

Methods

This was a trial-based economic evaluation study. One hundred and sixteen patients with ischemic stroke were recruited from neurology units in a Chinese hospital and randomized into intervention (n = 58) or usual care groups (n = 58). The intervention commenced with predischarge planning and transitioned to home follow-up postdischarge. Trained nurse case managers supported by an interdisciplinary team provided comprehensive assessment, individualized goal setting, and skill training to support home-based rehabilitation for intervention group participants. Standard care was provided to usual care group participants. Total cost and quality-adjusted life-years gained at 3-month (T1), 6-month (T2), and 12-month (T3) follow-ups were calculated. The incremental cost-effectiveness ratios between the groups were obtained.

Results

The intervention group showed a significant increase in utility compared with the usual care group at T1 (P = .003), T2 (P = .007), and T3 (P < .001). The average total QALY gain from baseline for the intervention group was higher than for the usual care group at all time points. The likelihood of being cost-effective ranged from 61.9% to 67.2% from the provider perspective, and from 59.7% to 66.8% from the societal perspective.

Conclusions

The results showed that the intervention program was cost-effective with significantly higher quality-adjusted life-years for stroke survivors when compared with usual care. It provides economic evidence to support the development of home-based stroke rehabilitation program, especially in the low- and middle-income countries.

Keywords: economics, standard of care, stroke, stroke rehabilitation

Introduction

The global stroke burden continues to rise, and China, the most populous developing country, bears the biggest stroke burden in the world.1,2 Worldwide, the 1-year recurrent stroke rate has reached up to 56.8% in patients with ischemic stroke.3 The increasing rate of stroke recurrence not only increases the disability and mortality rates of these patients but also requires expenses for treatment and rehabilitation. A recent review showed that the mean in-hospital costs for each recurrent stroke patient were US $17 121, and the 1-year disability costs were US $34 639.4 A growing body of evidence indicates the ongoing medical, functional, and psychosocial needs of stroke patients and their families after hospital discharge.5,6 Regular and ongoing follow-up by an interdisciplinary team with comprehensive interventions can maximize functional and psychosocial outcomes, prevent stroke recurrence, and improve quality of life (QOL) in stroke survivors.5 The crucial role of nurses in coordinating and sustaining stroke rehabilitation is well acknowledged,7 and the program effectiveness is substantiated with evidence.5,8-11 A systematic review of 27 studies examining the effectiveness of poststroke transitional care models showed that nurse-led interdisciplinary home-based rehabilitation programs reduced rates of readmission and length of stay, alleviated depressive symptoms, and improved health-related QOL in stroke survivors.9 The preliminary findings of a feasibility study adopting a 6-month transitional care program revealed statistically significant increases in the cost of using outpatient, family physician and specialist services, but the expenses were offset by a statistically significant decrease in expenditure on hospital and emergency room use at 6 months compared with the baseline.12 The economic benefits of nurse-led interdisciplinary transitional care programs for stroke survivors remain to be determined.

Current health economic literature includes studies evaluating nurse-led transitional care programs on patients with heart failure,13 gout,14 rheumatoid arthritis,15 and urinary incontinence.16 Hardly any studies have been done among stroke survivors. To our knowledge, this study is the first to evaluate the cost-effectiveness of a nurse-led interdisciplinary transitional care program on stroke survivors, especially in the low and middle-income countries (LMICs) where rehabilitation relies predominantly on hospital-based care.17 The findings can inform healthcare policy makers and other stakeholders, including patients, their caregivers, and funding organizations for appropriate allocation of resources to support stroke survivors in the community.

Study Aim and Objectives

This study aimed to assess the cost-effectiveness of the enhanced postdischarge home-based care program (EHP) for stroke survivors using the usual poststroke care as a comparator. Specifically, the objectives were to compare the quality-adjusted life-years (QALYs) gained, the costs (including the direct costs and indirect costs), the healthcare utilization outcomes (including readmission and length of hospital stay), and the incremental cost-effectiveness ratio (ICER) associated with poststroke care between the EHP group and the usual care group at 90, 180, and 365 days posthospital discharge.

Methods

Study Design

The study was presented according to the Consolidated Health Economic Evaluation Reporting Standards.[18] This was a trial-based economic evaluation study involving combined methods of

cost-utility analysis and cost-effectiveness analysis.[19] The cost-utility analysis was measured by the value attached to the health status of stroke survivors, in either the EHP or the usual care group, which is expressed as QALYs. The cost-effectiveness analysis was represented by ICER to examine the difference between the costs and health outcomes of the 2 groups.[20] The economic evaluation was conducted in parallel with the trial. All participants were followed up for 12 months after the baseline data collection, with outcome assessment data collected after discharge at 3, 6, and 12 months. Study details were reported elsewhere.[17]

Study Setting

This study was conducted in Harbin No 1 Hospital, a large grade A tertiary general hospital with 1438 hospital beds in Harbin, China. Participants were recruited from 4 neurology units of the hospital. The inclusion criteria were (1) aged ≥18, (2) having been diagnosed with acute ischemic stroke, (3) having minor to moderate stroke impairment (score ≥4 or <16) as defined by the National Institutes of Health Stroke Scale,[21] (4) having slight to moderately severe disability (score 2-4) as defined by the Modified Rankin Scale,[22] and (5) being discharged home. Exclusion criteria were (1) undergoing palliative treatment and (2) having conditions interfering with rehabilitation (eg, severe visual problems). This study was conducted in complying with the principles of the Declaration of Helsinki (1964) and granted ethical approval from the ethics committee of the (blinded for review).

Intervention

The 12-week EHP was delivered through an approach that combined enhanced discharge planning and postdischarge home follow-up, incorporating 5 systematic structured intervention protocols developed based on the assessment-intervention-evaluation Omaha System

framework,[11] to accommodate individual patient needs with a focus on functional improvement and self-management. Two trained nurse case managers supported by an interdisciplinary consultant team were responsible for assessing comprehensive needs of stroke survivors using the Omaha System,[11] setting individualized goals, and empowering patients through information sharing, skill training and coordinating the EHP. Each patient was provided with a stroke self-managed home care toolkit that contained (1) written and pictorial instructions for exercise, training, and stroke self-management; (2) a record of their goals, action plans, training tasks, and daily practice; and (3) equipment (eg, arm skate, clothespins, ball, bean bag, towel, and elastic bands) for rehabilitation training purposes. Figure 1 presents an overview of the EHP.

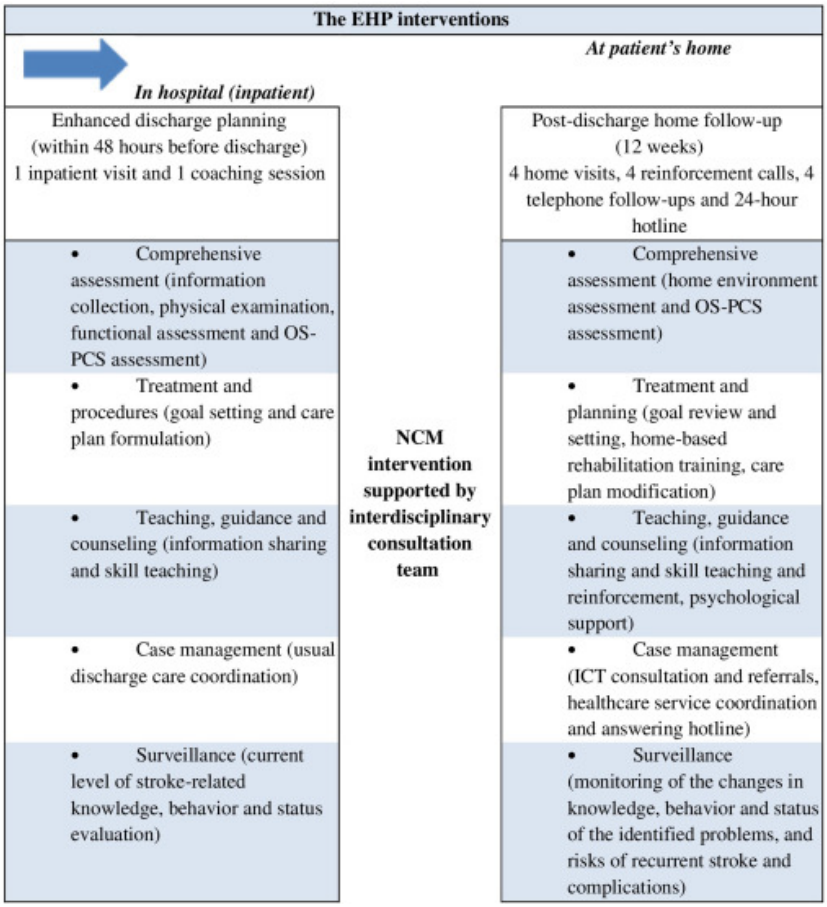

Figure 1 Overview of the enhanced postdischarge home-based care program intervention.

Usual Discharge Care

At the time of discharge, all participants received the standard discharge care, which included instructions on medication regimen, blood pressure and blood sugar monitoring, diet daily living care, rehabilitation training, drugs, and regular medical follow-up.

Cost and Health Outcomes

The cost and health outcomes were compared between the intervention and usual care groups at 90 (T1), 180 (T2), and 365 days (T3) post baseline assessment. The costs were estimated from both the healthcare provider and societal perspective in 2020 Chinese Yuan (¥, 6.9 CNY = 1 USD in 2020).[23] For the provider perspective, although the public medical insurance scheme in China usually covers 50% to 80% of the medical payment and the rest is paid by patients, we assumed that the government would be the end payer of the health service cost and intervention under this perspective. The cost categories included the (1) health service cost, (2) pre-program training, and (3) intervention cost, whereas the societal perspective incurred the (4) subjects' time cost for the intervention, (5) expenditure on rehabilitation equipment, medication, and caring service, and (6) indirect cost due to sick leave for the subjects and loss of workdays for family caregivers. The pre-program training cost covered the trainer cost, material required for the training, and the time cost for trainees, ie, 1 doctor and 2 nurse case managers, estimated by pro rating the monthly salary of the corresponding staff.[24] Intervention cost included the estimation of total time spent on the discharge planning, postdischarge home visit, and telephone follow-up by each type of staff and calculated using the methods described above. Other costs associated with the intervention included transportation and rehabilitation equipment cost, multidisciplinary team consultation, and toolkit provided to the patients. The total intervention cost was sum of the total time costs and other costs associated with the

intervention. Health service cost included all direct costs due to stroke-related readmissions and in/outpatient rehabilitation services. These were the actual total costs to the subjects, extracted from the hospital database. Other health service costs, such as unplanned visits to emergency or outpatient department self-reported by the subjects, were also included. The subject cost for the intervention included time spent on the discharge planning session, home visit or telephone follow-up, and the estimated time to carry out the designated training exercise of the intervention, ie, 90 minutes per day, 5 days per week, for 12 weeks. The annual average salary per person of urban households in Harbin (¥39 791, approximately US$5767) was used to estimate the total cost of time spent.[25] Out-of-pocket expenditure on rehabilitation equipment, medication, caring service, and transportation to any of the health services reported by the subjects were included in the cost calculation. Indirect cost due to sick leave was estimated based on the subject's self-reported actual loss of wage during the period, and the caregiver was also asked to report the number of workdays loss and associated salary. Subject-time spent because of readmissions, attending rehabilitation, emergency, and outpatient services costs were self-reported by the subjects and similarly translated into economic loss due to absence from work. The costing for the usual care group was calculated in the same way without the pre-program cost and the intervention. The cost also included a 3-minute social control call received by the usual care group.

QOL was measured with the EQ-5D-5L. The QOL data were translated into a single index value ranging from −0.391 to 1 using the EQ-5D-5L value set for China[26] and further transformed into a health utility value between 0 and 1 by using the index value minus the minimal value (−0.391) and then divided by the range (1.391). The QALYs gained over a period were calculated as the surplus or loss in utility value between 2 time points and multiplied to the length of time the subject spent with that value. Linear change in utility over

the period was assumed when calculating the QALY gained. For example, if the utility was 0.7 at baseline and 0.8 at 6 months, the QALY gained would be (0.8-0.7)/2 × 0.5 years = 0.025 QALYs.

Differences in health service utilization and QALY gained from baseline between the intervention and usual care group were compared using the Mann-Whitney U test for non-normally distributed continuous variables[27]; the analysis of variance test was used for health utility values, and repeated measures analysis of variance to compare the health utility over time within groups.[27] All statistical analysis was conducted using STATA 15.1 (StataCorp, College Station, TX).

Data Collection

Cost data were collected through the administration of questionnaires, supplemented by and checked against the expenditure records provided by participants and cost information obtained from the hospital information system. Two trained research assistants, who were blinded to group allocation, were responsible for data collection. Please find the questionnaires in the Appendix Files 1 and 2 in Supplemental Materials found at https://doi.org/10.1016/j.jval.2024.01.012.

Cost-effectiveness Analysis

Total cost and QALY gained at T1, T2, and T3 were calculated for both groups, and the ICERs between the groups were calculated by dividing the difference in cost by the difference in QALYs. The ICERs were compared with the willingness to pay threshold of 1.5 gross domestic product (GDP) per capita [¥107 730/QALY, China GDP per capita in 2020 = ¥71 820

(approximately US$ 10 409)][23] as recent studies estimated that the willingness to pay for a QALY for the Chinese population would be around 1.5 to 1.75 times the GDP per capita.[28] Sensitivity analyses were conducted to examine the uncertainties around parameters. Deterministic sensitivity analysis was performed by changing 1 or multiple parameters at a time according to the range. The cost of the program, health service utilization, subject expenditure, and indirect cost for the intervention group varied to 30% lower/higher than the base value to test the impact of the cost-effectiveness of the intervention. QALY gained from the baseline for both the intervention and usual care groups were tested with the range of the 95% CIs. Probabilistic sensitivity analyses were conducted by recalculating the incremental cost, QALY gained, and ICER 1000 times, each time selecting a random value for program cost, health service utilization, subject expenditure, indirect cost, and health utility from specific distribution. Program cost varied within +/−30% of the base value using uniform distribution. The health service utilization, subject expenditure, and indirect cost values varied based on a gamma distribution, whereas the QALY gained from baseline at each time point was assumed a normal distribution. The results were presented in cost-effectiveness planes and acceptability curves.

Results

A total of 116 subjects were followed up throughout the study period for both the intervention and usual care groups. The mean age was 66. A majority of subjects were retired (82.8%). More than half of subjects got a modified Rankin score of 3 (64.7%), followed by score of 2 (18.1%) and 4 (17.2%). A consistent trend of lower numbers of readmissions, use of rehabilitation services, and unplanned visits to emergency or outpatient department was observed in the intervention group, although statistically significant differences were noted only for

readmission at T1 and T2, and for unplanned emergency/outpatient visits at T2 (Table 1). There was no significant difference in the utility values between the usual care and intervention groups at the baseline ($P = .621$), but both groups showed a significant increase over time from the baseline ($P < .001$). The intervention group showed a larger increase in utility than the usual care group, and the difference was significant at T1 ($P = .003$), T2 ($P = .007$), and T3 ($P \leq .001$). The average total QALY gain from baseline for the intervention group was 0.02, 0.06, and 0.15 and for the usual care group was 0.01, 0.04, and 0.09 at T1, T2, and T3, respectively.

Table 1: Subjects' health outcome by group.

ANOVA indicates analysis of variance.

∗Mann-Whitney *U* test.

†ANOVA test, comparison between groups at T1, T2, and T3 adjusted with baseline.

‡Repeated measures ANOVA.

Outcome	**Intervention group (n = 58)**	**Control group (n = 58)**	***P* value**
Health service utilization			
Readmission episode, mean (95% CI)			
T1	0.09 (0.01-0.16)	0.22 (0.11-0.33)	.041∗
T2	0.16 (0.06-0.25)	0.36 (0.20-0.52)	.042∗
T3	0.26 (0.13-0.38)	0.45 (0.26-0.63)	.107∗
Total length of stay, mean (95% CI)			
T1	1.02 (0.11-1.93)	2.93 (1.28-4.58)	.370∗

T2	1.86 (0.68-3.04)	4.19 (2.11-6.27)	.053∗
T3	2.97 (1.52-4.42)	5.31 (2.72-7.90)	.148∗
Rehabilitation service, mean (95% CI)			
T1	2.17 (0.30-4.05)	3.90 (0.55-7.24)	.543∗
T2	3.55 (0.76-6.35)	7.26 (0.97-13.55)	.233∗
T3	4.07 (0.57-7.57)	8.26 (0.42-16.10)	.166∗
Unplanned emergency/outpatient service, mean (95% CI)			
T1	0.22 (0.11-0.33)	0.47 (0.27-0.66)	.073∗
T2	0.33 (0.19-0.46)	0.74 (0.47-1.01)	.040∗
T3	0.48 (0.30-0.66)	0.88 (0.58-1.18)	.085∗
Health utility			
Utility value, mean (95% CI)			
Baseline	0.77 (0.74-0.81)	0.79 (0.75-0.82)	.621†
T1	0.92 (0.90-0.94)	0.88 (0.85-0.91)	.003†
T2	0.94 (0.92-0.96)	0.90 (0.86-0.93)	.007†
T3	0.96 (0.94-0.98)	0.88 (0.84-0.92)	<.001†
Within-group comparison (*P* value)	<.001‡	<.001‡	
QALY gain from baseline, mean (95% CI)			
T1	0.02 (0.02-0.02)	0.01 (0.01-0.02)	.009∗
T2	0.06 (0.05-0.07)	0.04 (0.03-0.05)	.004∗

T3	0.15 (0.12-0.17)	0.09 (0.06-0.12)	.001∗

The total costs of the program from the provider and societal perspectives are shown in Table 2 and the unit costs were attached in Appendix File 3 in Supplemental Materials found at https://doi.org/10.1016/j.jval.2024.01.012. The intervention group had a total pre-program and intervention cost of ¥51 625 (US$ 7482) (¥890, US $129 per subject) from the provider perspective and ¥157 142 (US $22 774) [¥2709 (US $393) per subject] from the societal perspective. The intervention group had a lower health service cost than the usual care group at all subsequent time points. The total cost per subject for the intervention group was ¥2379 (US $345), ¥3307 (US $479), and ¥4686 (US $679), and for the usual care group was ¥3948 (US $572), ¥7111 (US $1031), and ¥8396 (US $1217) for T1, T2, and T3, respectively from the provider perspective. From the societal perspective, the total costs per subject for the intervention group were ¥6111 (US $886), ¥8878 (US $1287), and ¥12 885 (US $1867), and those for the usual care group were ¥9227 (US $1337), ¥14 832 (US $2150), and ¥19 763 (US $2864) for T1, T2, and T3, respectively. The intervention group resulted in a lower cost than the usual care group at all time points while also having gains in QALYs, and this is consistent in all deterministic sensitivity analyses (Table 3). The cost-effectiveness plane shows that when all uncertainties were considered together, the probability of the intervention being both cost saving and gaining QALYs, ie, the south-eastern quadrant, was 32.4%, 25.4%, and 22.2% at T1, T2, and T3, respectively, from the provider perspective, and 36.4%, 38.3%, and 37.0%, respectively, from the societal perspective (Fig. 2). The likelihood of being cost-effective at the cost-effectiveness threshold of ¥107 730/QALY ranged from 61.9% to 67.2% from the provider perspective and from 59.7% to 66.8% from the societal perspective (Fig. 3).

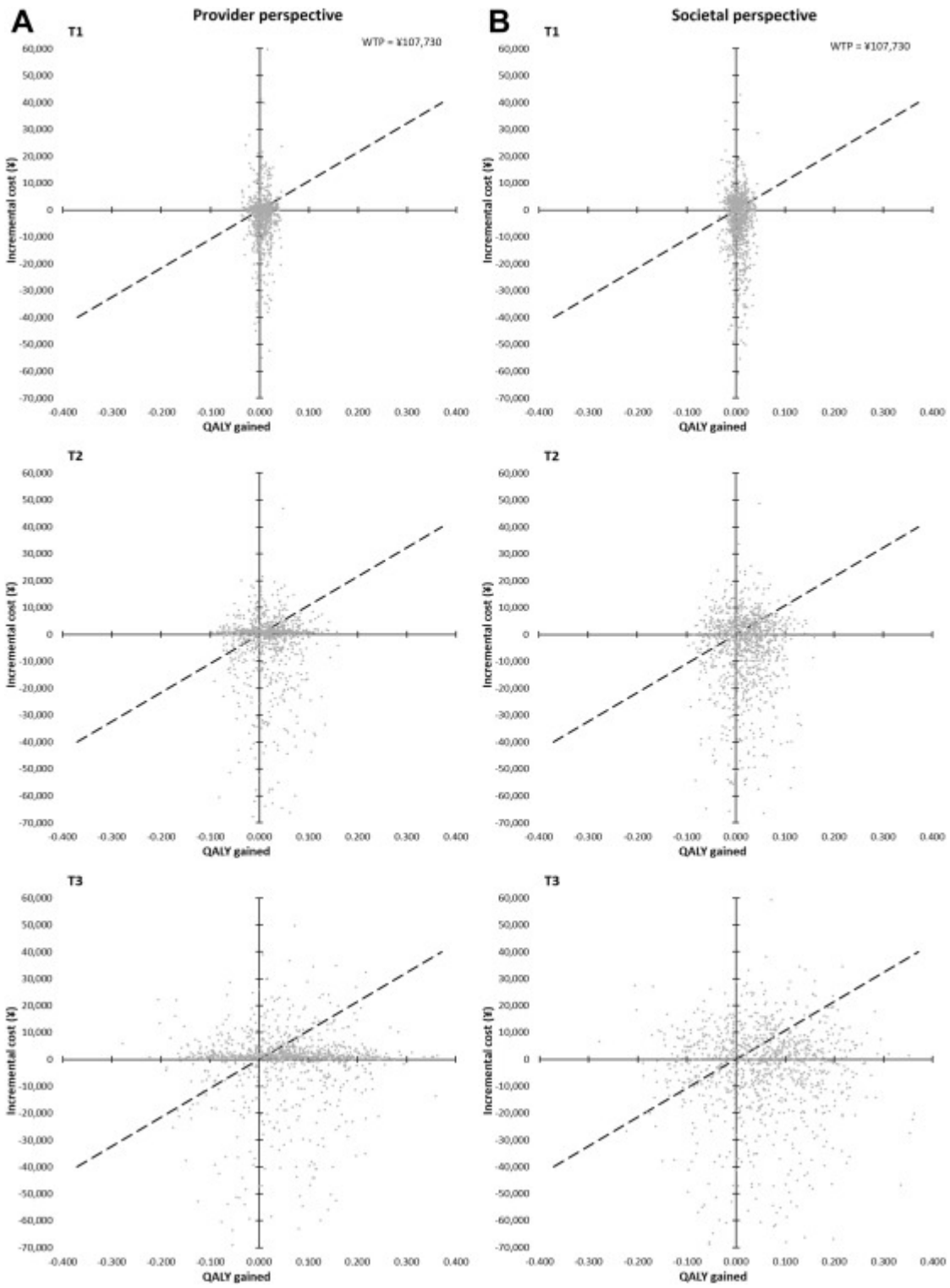

Figure 2 Cost-effectiveness planes.

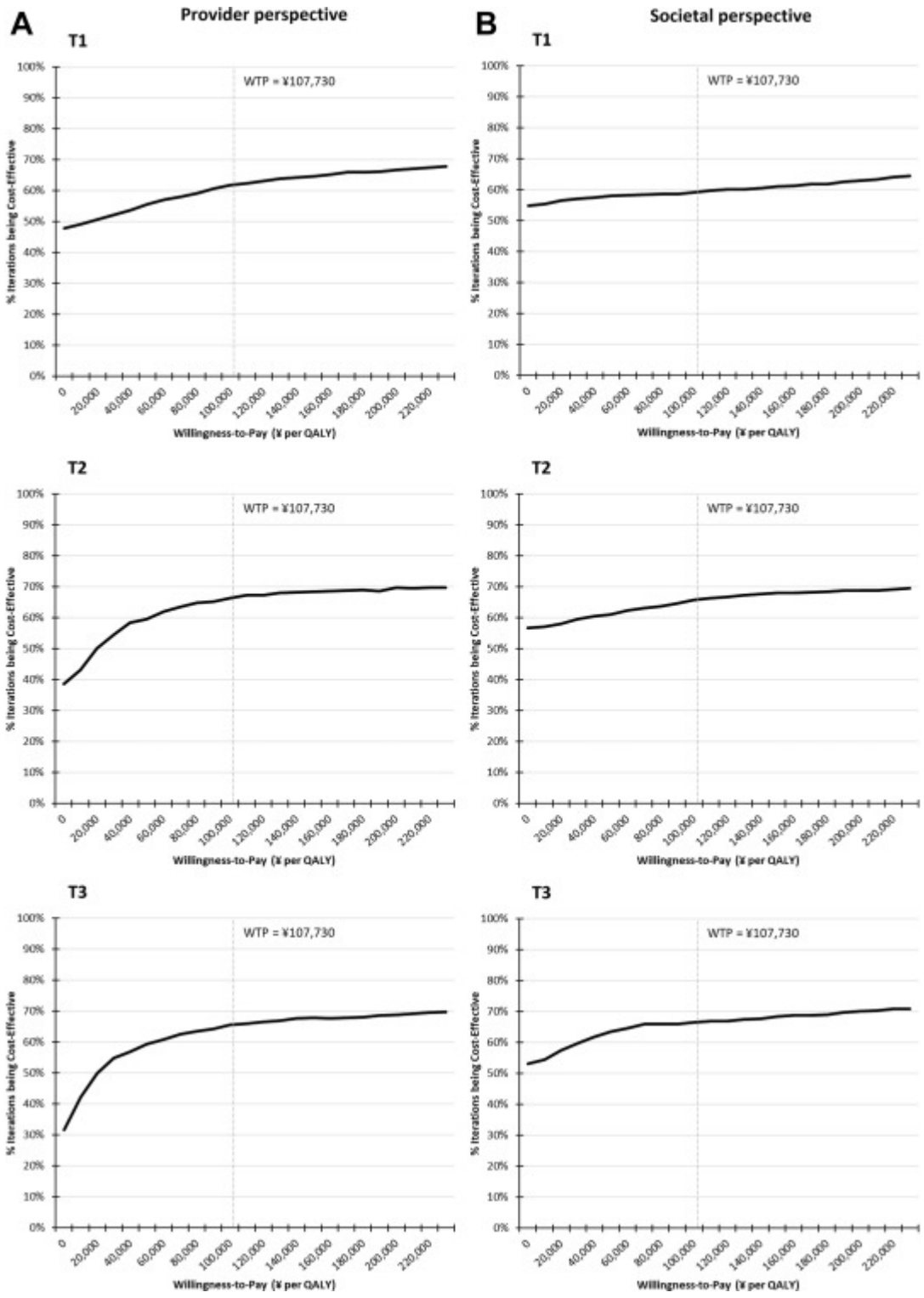

Figure 3 Cost-effectiveness acceptability curves.

Table 2 Cost of program by group.

∗Included in societal perspective only.

Staff	**Intervention group (n = 58)**			**Control group (n = 58)**		
Pre-program training	**Total time (hours)**	**Hourly cost (¥)**	**Total cost (¥)**	**Total time (hours)**	**Hourly cost (¥)**	**Total cost (¥)**
Trainer (training course fee)	-	-	7600	-	-	-
Trainee (doctor)	80.00	27.10	2168	-	-	-
Trainee (NCM 1)	80.00	26.19	2095	-	-	-
Trainee (NCM 2)	80.00	27.87	2230	-	-	-

Intervention cost	**Total time (hours)**	**Hourly cost (¥)**	**Total cost (¥)**	**Total time (hours)**	**Hourly cost (¥)**	**Total cost (¥)**
Intervention						
NCM 1	285.89	26.19	7487	-	-	-
NCM 2	31.03	27.87	865	2.90	27.87	81

NCM 1 transportation	-	-	3600	-	-	-
Consultancy fee	-	-	409	-	-	-
Equipment cost						
Pre-discharge lab	-	-	4275	-	-	-
Nursing intervention	-	-	6395	-	-	-
Toolkit for subjects	-	-	14 500	-	-	1160
Subject-time cost*						
Discharge planning	31.03	19.06	591	-	-	-
Home visit and telephone call follow-up	285.89	19.06	5448	2.90	19.06	55
Training exercise	5220.00	19.06	99 478	-	-	-

Health service cost			**Total cost (¥)**			**Total cost (¥)**
Readmission						
T1	-	-	63 199	-	-	162 889
T2	-	-	108 145	-	-	321 565
T3	-	-	180 164	-	-	392 204

Rehabilitation						
T1	-	-	19 060	-	-	50 789
T2	-	-	25 700	-	-	71 074
T3	-	-	28 700	-	-	73 409
Unplanned visit to emergency/outpatient department						
T1	-	-	4086	-	-	14 056
T2	-	-	6359	-	-	18 582
T3	-	-	11 272	-	-	20 115

Subject expenditure*			**Total cost (¥)**			**Total cost (¥)**
Rehabilitation equipment						
T1	-	-	2003	-	-	358
T2	-	-	2303	-	-	858
T3	-	-	2303	-	-	858
Medication						
T1	-	-	77 591	-	-	135 766
T2	-	-	137 787	-	-	227 627
T3	-	-	259 693	-	-	391 517

Caring service						
T1	-	-	0	-	-	6600
T2	-	-	0	-	-	13 200
T3	-	-	0	-	-	26 400
Transportation cost						
T1	-	-	929	-	-	2138
T2	-	-	1461	-	-	3142
T3	-	-	1878	-	-	3652

Indirect cost*	**Total time (hours)**	**Hourly cost (¥)**	**Total cost (¥)**	**Total time (hours)**	**Hourly cost (¥)**	**Total cost (¥)**
Subject-time cost for health services						
T1	1595	19.06	30 404	4374	19.06	83 355
T2	2870	19.06	54 695	6370	19.06	121 396
T3	4451	19.06	84 821	8002	19.06	152 489
Wage loss due to sick leave						

T1	-	-	0	-	-	35 200
T2	-	-	10 640	-	-	38 800
T3	-	-	10 640	-	-	40 900
Productivity loss for caregiver						
T1	-	-	0	-	-	42 710
T2	-	-	10 700	-	-	42 710
T3	-	-	10 700	-	-	43 410
Total cost per subject (provider):						
T1	-	-	2379	-	-	3948
T2	-	-	3307	-	-	7111
T3	-	-	4686	-	-	8396
Total cost per subject (societal):						
T1	-	-	6111	-	-	9227
T2	-	-	8878	-	-	14 832
T3	-	-	12 885	-	-	19 763

Table 3 Results of cost-effectiveness analysis from the provider and societal perspective.

CS indicates cost saving; ICER, incremental cost-effectiveness ratio; QALY, quality-adjusted life-year.

∗Included in societal perspective only.

	T1			**T2**			**T3**		
Item	**Incremental cost per subject (¥)**	**QALY gained per subject**	**ICER (¥)∗**	**Incremental cost per subject (¥)**	**QALY gained per subject**	**ICER (¥)∗**	**Incremental cost per subject (¥)**	**QALY gained per subject**	**ICER (¥)∗**
Provider perspective									
Base case	−1569	0.007	CS	−3804	0.021	CS	−3710	0.057	CS
Pre-program and program cost									
30% lower	−1836	0.007	CS	−4071	0.021	CS	−3978	0.057	CS
30% higher	−1302	0.007	CS	−3537	0.021	CS	−3443	0.057	CS
Health service utilization									

30% lower	−2016	0.007	CS	−4529	0.021	CS	−4849	0.057	CS
30% higher	−1122	0.007	CS	−3079	0.021	CS	−2572	0.057	CS
QALY gained from baseline									
95% CI minimum	−1569	0.007	CS	−3804	0.023	CS	−3710	0.062	CS
95% CI maximum	−1569	0.006	CS	−3804	0.020	CS	−3710	0.053	CS
Societal perspective									
Base case	−3116	0.007	CS	−5954	0.021	CS	−6878	0.057	CS
Pre-program and program cost									
30% lower	−3929	0.007	CS	−6767	0.021	CS	−7691	0.057	CS
30% higher	−2303	0.007	CS	−5141	0.021	CS	−6065	0.057	CS
Health service utilization									

30% lower	−3563	0.007	CS	−6679	0.021	CS	−8017	0.057	CS
30% higher	−2670	0.007	CS	−5229	0.021	CS	−5740	0.057	CS
Subject expenditure									
30% lower	−3533	0.007	CS	−6686	0.021	CS	−8243	0.057	CS
30% higher	−2700	0.007	CS	−5222	0.021	CS	−5513	0.057	CS
Indirect cost									
30% lower	−3274	0.007	CS	−6347	0.021	CS	−7427	0.057	CS
30% higher	−2959	0.007	CS	−5560	0.021	CS	−6329	0.057	CS
QALY gained from baseline									
95% CI minimum	−3116	0.007	CS	−5954	0.023	CS	−6878	0.062	CS
95% CI maximum	−3116	0.006	CS	−5954	0.020	CS	−6878	0.053	CS

Discussion

Discharged from the hospital and returning home after an acute episode of stroke is a stressful and challenging time for stroke survivors and their families.[5] Nurse-led stroke transitional care programs with support from a team of multidisciplinary healthcare providers have proven useful in rehabilitation.[7] However, the health service system in China is facing both manpower and resource challenges to provide organized postdischarge stroke care services. The lack of structured stroke rehabilitation program, particularly those designed for home-based care is shared by other LMIC.[17] The lack of access for sustainable poststroke rehabilitation contributed to individuals' long-term disability.[29] This study provides evidence to support a home-based stroke rehabilitation program that is cost-effective and more accessible to stroke survivors without relying on the oversubscribed hospital-based care.

To our knowledge, the current study is one of few to adopt and evaluate the cost-effectiveness of an innovative care delivery model of an enhanced postdischarge home-based care program for stroke survivors. The results showed that the intervention program was less expensive but yielded significantly higher QALYs for stroke survivors compared with usual care. Findings demonstrating that most of the replications of QALYs fell in the south-eastern quadrant of the cost-effectiveness plane for both provider and societal perspectives, coupled with the ratios of incremental cost-effectiveness, indicated that the program was cost-effective. Similarly, a study from China found that, compared with routine care, the intervention program delivered by nurses and supported by a multidisciplinary healthcare team in a rehabilitative hospital decreased the incidence of major immobility complications, reduced the total costs, and increased QALYs among immobile, ischemic stroke patients.[30] Another study, from Thailand, compared the cost-effectiveness of a home rehabilitation program with conventional hospital

care for acute stroke patients and found that the average cost of rehabilitation at home was statistically significantly higher than at hospital, but with higher QALY gains.[31] However, our intervention group had higher QALY gains and the program was more cost-effective.

The sustainability of a nurse-led transitional program depends not only on the clinical benefits to patients but also its cost-effectiveness.[32] The common barriers to stroke rehabilitation in LMIC are access, resources, and insufficient skilled workforce. This study used standards and training packages, using inexpensive and domestic items to empower patients and family members with self-management and rehabilitation skills that can be accomplished in the home environment.[17] Health service utilization of stroke survivors was measured along with cost outcomes in this study, which drew on existing stroke-specific evidence obtained from clinical guidelines, scientific literature, expert consultations, and accumulated nursing experience in designing poststroke home-based rehabilitation interventions. This integration produced translated evidence into practice that suited the context of practice, and results proved the EHP cost-effective in supporting stroke survivors returning home with gains in QOL. In this study, the value of the nurse's essential role in facilitating home-based rehabilitation was highlighted in the Chinese context, where nurses, especially within the hospital framework, had the opportunity to facilitate seamless care by ensuring continuity of practice, as well as managing available resources to meet stroke survivors' needs.[33]

Limitations

This study was not designed to determine which of the EHP components of the complex intervention was responsible for the effects observed. The nurse played a key role in delivering and coordinating the complex intervention, but there was a lack of detailed documentation of

the process to differentiate direct service activities from indirect service activities for which costs may vary. The generalization of empirical findings might also be an issue of concern because this trial was being conducted in a single hospital site.

Conclusions

Countries with limited resources, China and other LMIC likewise, require stroke rehabilitation solutions that are affordable and accessible. The strengths of this study are that we have developed and tested a structured home-based stroke rehabilitation program that was effectively clinically[17] and economically as presented in this article. This study developed a program delivered by a nurse with the involvement of the multidisciplinary team, used inexpensive and domestic items that were adoptable for home environment. The higher average total QALY gain for the intervention group compared with the usual care group at all 3 time points provided evidence for the stakeholders (patients and families, healthcare providers, decision makers in healthcare organizations, and government) to adopt the EHP to support stroke survivors for home-based rehabilitation.

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