SYSTEMATIC REVIEW

THE EFFECTIVENESS OF HOME-BASED CARE INTERVENTIONS FOR STROKE SURVIVORS: A SYSTEMATIC REVIEW OF PHYSICAL AND PSYCHOLOGICAL OUTCOMES

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ABSTRACT

Many people with neurological impairment following stroke prefer home-based care instead of long-term hospitalization. This study aims to identify the physical and psychological outcomes of home-based care after a stroke. The studies were identified by searching the following electronic databases, PubMed, ProQuest, Web of Science, PsyARTICLES, MedLINE, CINAHL, and EBSCO. Twenty-seven articles analyzed and reviewed using the content analysis method. Most physical interventions resulted in increased upper body motor function. The most common equipment were treadmill and computer games. The studies we reviewed highlighted the muscle limb pain and falling as the adverse events that occur during home-based care, but most studies did not systematically document those adverse events. Home-based interventions are particularly effective to improve motor function and reduce anxiety and depression.

***Keywords**: home-based care, outcomes, physical, psychological, stroke.*

INTRODUCTION

Home-based care interventions are intended to improve stroke survivors' health status, which is known to affect the after-stroke outcomes. Home-based exercises, such as walking, activities of daily living (ADL), and leisure activities, were shown to improve and encourage stroke survivors to maintain an optimum level of physical activity[1]. Some studies reported that several home intervention outcomes are extremely critical for stroke survivors.

The growing number of stroke survivors has drawn the attention of government agencies, clinicians, public health specialists, and the private sector due to the growing concerns about cardiovascular health[2]. Stroke has become one of the prioritized non-communicable diseases by the World Health Organization (WHO). Stroke-related deaths and disability-adjusted life years (DALYs) in 2013 were higher in developing countries than in developed countries (75% vs 25%, and 81% vs 19%, respectively). For ischemic (corrected) stroke, the contribution of DALYs and deaths were the greatest in developed countries, while the proportion of hemorrhagic stroke was highest in the developing countries[3].

Globally, stroke is the leading cause of disability in adults[4]. Fifteen million people experience a stroke every year, 5 million dies from it, and 5.5 million become permanently disabled[5,6]. Disability following stroke is commonly caused by neurological disorders that result in limb contracture. Stroke survivors have an increased proportion of disability (based on > 2 scores on the Modified Rankin Scale) of 16% and 26% in one month ($p < 0.001$) for minor and severe stroke, while 96% were disabled at one month. Moreover, 39% of stroke survivors were disabled five years after the stroke[5]. These comorbidities, combined with other complications, affect both the physical and mental health of stroke survivors[6,7].

Unable to do regular activities, daily living becomes a burden not only for the stroke survivor but also for their families[6]. New strategies should integrate community interventions for improving health strategies across the care continuum and care settings. The community empowerment goals include prevention, delay, and the management of stroke conditions[3]. As a result, the frequency of patients who experienced home care vs institutionalization increased within five years after a stroke[5]. Stroke survivors are becoming more community-focused and not as dependent on hospital-based care[8].

Six main factors are influencing the need for home care. First, life expectancy has increased, so there is a larger elderly population. Many of the elderly exhibit increased dependence, thereby increasing the cost of public services. Second, social status, values, and behavior change over time. Families with wandering children could not take care of their family members in their home; this includes the fact that employment opportunities for women are much higher, reducing the time for daily home care. Third, epidemiological trends change over time. Non-communicable diseases result in patients having chronic illnesses that can be effectively treated at home. Fourth, improved economic conditions mean patients can be treated by some sophisticated tools and equipment in their homes[9,10]. Fifth, a change in attitude and expectation, means that many people already have modern equipment, such that home care is the best choice for caring for the patients. The last factor is the change in both policy and choice. Home care has been shown to improve patient and family quality of life, including changes in resources from short-term care to long-term care[9]. Home-based care has been shown to increase the ADL and reduce the risk of decreased ADL at a younger age, thus reducing the risk of death and hospitalization period for the elderly groups[8]. The increase in activities and decrease in morbidities and mortality ultimately improve the health status of patients[11].

The effectiveness of home-care programs is advocated by Barbosa and Tronchin[12]. The benefits of home-care programs are minimizing hospitalization time, which optimizes hospital bed usage; prevents the patient's re-hospitalization; reduces infection; connects family members and caregivers; increases family participation in ADL within a social environment, thus improving the quality of life for the patients and the people closest to them; and provides the continuing education opportunities for health professionals in the specialized care areas[13].

A study by Tsuchihashi-Makaya *et al.* was comprised of 161 patients who were divided into home-based care and regular care or control programs in the hospital[14]. The authors reported that home care was more effective for improving psychological outcomes in the patient, including significantly lower the depression and anxiety levels ($p < 0.05$) compared to regular care during the first six months of treatment. Sorocco et al. found that in addition to reducing stress, home care also reduced the degree of dementia and post-traumatic stress disorder (PTSD) symptoms[15].

The purpose of the present systemic review was to evaluate outcomes associated with home-based care for people following stroke and to identify the adverse effects of home-based care interventions, including the devices that are used in this milieu.

METHODS

Search strategy and analysis

The search for relevant articles was conducted from July to August 2016 using the following databases: PubMed, ProQuest, Web of Science, PsyARTICLES, MedLINE, CINAHL, and EBSCO. The used keywords were "home-based", "community-based", "interventions", "effects", "health outcomes", "stroke", "cerebrovascular", "brain attack", "chronic illness", "chronic disease", long-term care", "family practice", "primary health care", "community health services", "therapy-based intervention", and "patient". Some of the same keywords are used in articles related to both home-based intervention and stroke outcomes. Eligible articles were analyzed in detail using the content analysis method without any statistical tests.

Inclusion and exclusion criteria

Article selection was based on the study objectives on health outcomes in home-based care for stroke survivors. Included published articles were full text, in English, and published from 2011 to 2016. The exclusion criteria were paper that did not involve the health care professional as part of the home intervention and observational studies. Three reviewers independently performed an eligibility assessment.

RESULTS

There were 1,915 articles identified using the previously stated keywords. After scanning the abstracts, we found 93 articles were relevant to the topic of our review. Based on the inclusion and exclusion criteria, 27 articles were analyzed in detail using the content analysis method without any statistical tests. The extraction of articles relied on the Preferred Reporting Items for Systemic Reviews and Meta-Analyses (PRISMA) guidelines (Figure 1).

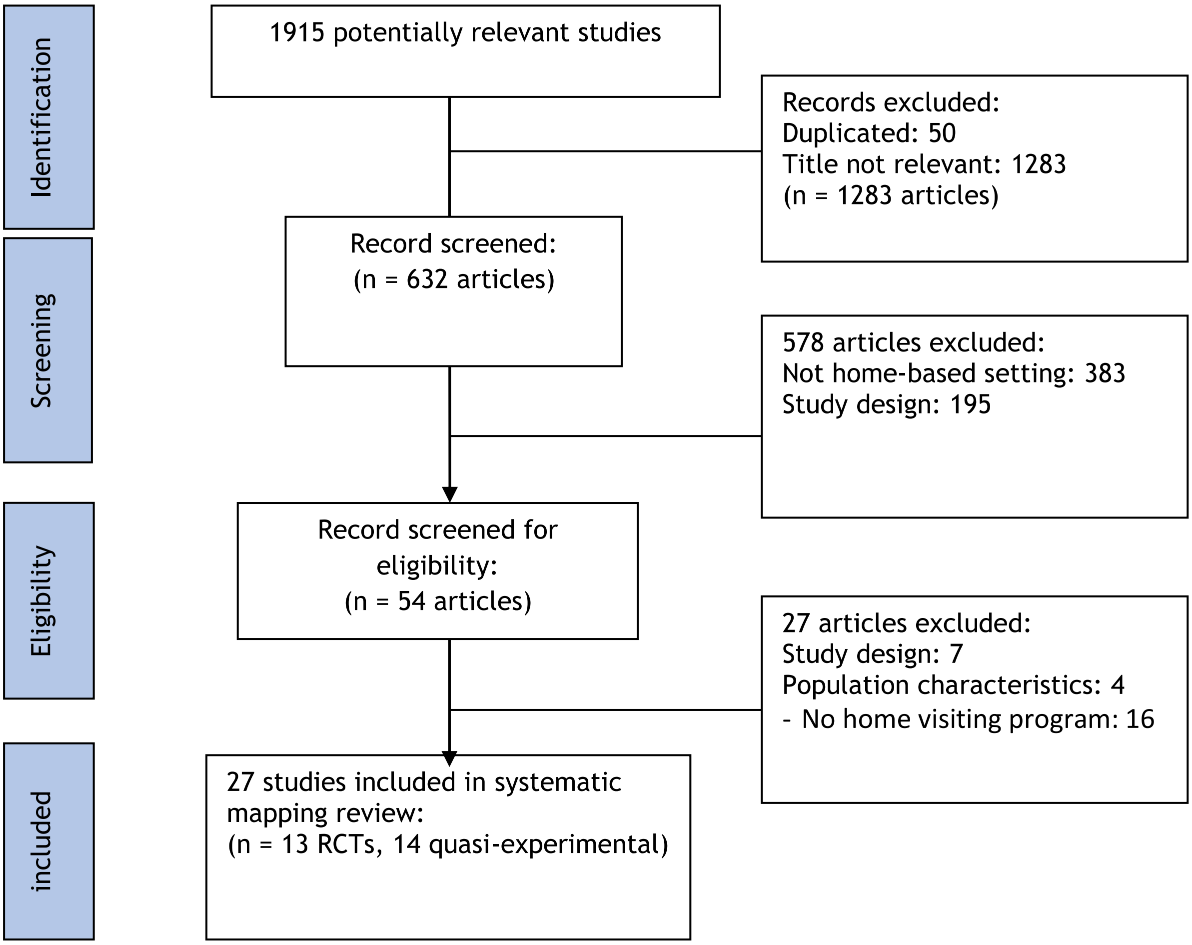

Figure 1: PRISMA flow diagram for search and selection of studies for structured review[16].

General description

The 27 full-text articles that were reviewed in detail by research members are displayed in the summary Table (Supplementary data 1). The table includes author, study design, number of research participants, interventions and outcomes, equipment, and adverse effects.

There were 3,323 subjects with home-based intervention in all of the reviewed studies. Thirteen studies were randomized control trials and 14 studies were quasi-experimental, with and without controls. Based on the interventions, the researcher categorized the patient outcomes as physical or psychological (Table 1). Seventeen studies mentioned home-based care that involved some equipment [17-32], while 10 studies reported none (Table 2)[33-42]. Minor adverse effects were reported in three research papers. Muscle pain in the limbs, wrists, and shoulders was briefly mentioned in two studies and was described in detail in one paper. Three interventions reported no adverse effects, but most interventions did not report any adverse effects at all (18 studies).

Table 2 shows the equipment used in home-based care interventions; there were more studies that did not use any equipment compared to studies that did use the equipment. In the studies that used equipment, treadmills and computer games (or videos) (23.53%) and robotic-oriented features (17.65%) were predominately reported. Other interventions included the usage of applied electrical stimulation, audiovisual tools, static bicycles, and orthoses.

Table 1: Home-based care intervention outcome with stroke survivors

Health outcome	Percentage (%)	Author
Physical outcomes		
Upper extremity motor function	33.33	14,21,23,24,21,26,28,29,32,34
Walking ability	33.33	15-18,20,25,27,34,36
Health-related quality of life	29.63	14-16,19,27,30,33,39
Activity of daily living (ADL)	25.93	13,21,24,25,28,33,39
Functional status	22.22	20,25,27,30,37,38
Health status and health outcomes post stroke	22.22	15,18,25,26,32,38
Motor and non-motor function	14.81	19,23,25,26
Weight bearing and standing balance	11.11	20,25,36
Lower extremity motor function	7.41	32,34
Avoiding care dependencies	7.41	30,38
Clinical function	7.41	20,34
Hospital admission/ re-hospitalization	7.41	26,35
Length of stay in hospital	7.41	26,35
Speech and communication ability	3.7	31
Gait speed	3.7	16
Disability level	3.7	39
Exercise frequency	3.7	16
Time up and go, time down and up the stairs	3.7	20
Emergency department attendance	3.7	35
Psychological outcomes		
Depression and anxiety	22.22	13-15,19,30,38
Community and social participation	18.52	17,22,25,37,38
Dementia/ impairment in cognitive status	11.11	13,25,30
Self-efficacy	7.41	23,30

Table 2: intervention studies with medical equipment

Instruments	N	Percentage (%)	Author
Treadmill	4	23.53	16-18,25
Computers (games)	4	23.53	22-24,27
Robot	3	17.65	14,19,28
Electrical stimulation	2	11.76	21,26
Audiovisual	2	11.76	13,39
Static bicycle	1	5.88	15
Orthoses	1	5.88	20
Without equipment	1	37	23,29,30-38

DISCUSSION

Home-based care intervention and physical outcomes

The results of the review indicate that home-based care is more useful in improving the upper limb motor function and walking ability. According to Cornally et al., this is a function of home-based care being aimed at symptom management, comfort, and prioritizing spiritual needs rather than the decision-making processes and settlement of family conflicts[43].

Motor impairment is the most common stroke-related issue, regarded as full or partial mobility limitations. Motor impairment commonly occurred in the face, arms, and legs on one side of the body. The home-based intervention was directed at improving the motor impairment and function; for example, a patient could walk as a function of having good muscle strength[44]. Many patients recovered after medical therapy and most with long-term disabilities (chronically disabled) saw improvement as well[45]. Furthermore, the care goals for stroke patients in a home-based setting is often the increased patient's motor function.

Walking is one of the functional activities to live in society. In post-stroke patients, there is a decrease in walking ability, with an average walking speed of only 0.4–0.8 meters per second, as more post-stroke patients have difficulty walking long distances. Exercise, including the use of a treadmill, is intended to improve the function of the lower extremities to improve the patient's ability to walk [46].

A study by Ada et al. mentioned that exercising on a treadmill without body support and ground-based walk training three times a week for four months was more effective than either a two-month program or no training for improving walking abilities based on the walking distance and speed result[46]. The improvement was observed in post-stroke people who were residing in the community. According to these authors, walking skills with treadmill exercises began to increase after 4 months of practice and lasted up to 12 months; however, if the exercise was stopped after that, the ability to run or walk fast tend to decrease. Thus, improvement in running ability is not dependent on the tools used, but on the regularity and continuity of the exercise.

Home-based care intervention and psychological outcomes

According to the American Heart Association Stroke Outcome Classification (AHA-SOC), the body functional impairments are common. In a study of 94 stroke patients, the following functional impairments were observed: sensory (45%), motor (35%), memory (32%), language (31%), and vision (20%). Each survivor suffered from two functional impairments on average, with the main one being sensory (45%)[5]. A functional impairment could alter one domain but was likely to alter others as well. Stroke survivors have depression symptoms when their impairments severely affect several domains and negatively affect their quality of life.

The results of this review showed that activities with home-based care can reduce the level of depression and anxiety in patients, which increases in their participation in the community and social activities. Stroke survivors often experience physical disability, fatigue, and depression. Research shows that 59% to 91% of stroke patients experienced severe physical and emotional conditions. Furthermore, 76% of stroke survivors suffered from a physical disability and 28% of them were affected by severe physical disability.

The effectiveness of a home-based care program was discussed by Barbosa and Tronchin[12]. The authors explored the benefits of home care, including the reduced of hospitalization period, optimized hospital bed usage, prevention of re-hospitalization, reduced rate of infections, better communication between family members and caregivers, increased family participation in patient's daily activities that fostered a social environment, improved quality of life for the patient as well as those closest to them, and continued education opportunities for health professionals in specialized areas of care.

Home-care programs not only improve the patient's physical health status but also their psychological status[14]. Of 161 patients divided into home-based disease management and regular care or control programs, the results clearly showed that home care was more effective in improving a patient's emotional condition. Home-based disease management was able to significantly lower patient depression and anxiety levels ($p < 0.05$) compared to regular care during the first 6 months of treatment. In addition to reducing anxiety and depression, home-based care was able to reduce the degree of dementia and symptoms of PTSD[14,47]. The presence of home-based care encourages a patient to establish a more comfortable environment with their family[16].

Treadmill and video games

Aerobics has been shown to increase the function of the lower extremities and the general capacity of stroke patients. The results showed that aerobic exercise did not cause any side effects in seven patients. The results also mentioned that walking exercise (aerobic) showed no significant difference in physical health improvement compared with cycling. The results by Gordon et al. suggested that aerobic exercise with walking can improve the weight-bearing ability compared to non-exercise controls as measured by a six-minute walking test, but the results were not significantly different in terms of functional ability by the Barthel Index[37]. An increase in exercise activity is not always synonymous with the improvement in the patient's functional ability. Walking on a treadmill can increase a patient's functional capacity, given that the exercise increases the patient's endurance. This, in turn, stimulates patients to eat more, which should lead to more rigorous walking (faster movement over longer distances), making it easier to perform daily activities at home. Treadmill use is as effective as ground-based walking exercise, both are useful for increasing endurance[37,48].

The exercise with a treadmill could improve a patient's walking ability if done regularly and in long periods (for example, more than six months)[49]. This affects the nature of exercise-mediated adaptation to exercise, thereby improving locomotor control. Practice and the stimulation of the motor-sensory system are the means to increase neuroplasticity. Thus, the improvement of motor function does not lie in the tools used, but in prescribing exercise; conventional exercises done with high intensity over long periods also improve the patient's walking ability and overall function, as stated above[50].

Walking and cycling are some cardiorespiratory exercises that aim to increase endurance and the body's ability to adapt to exercise through the increased oxygen intake rather than muscle strength[51]. Cardiorespiratory training improves certain components of physical fitness. It is typically performed for extended periods on devices with ergometers (for example, treadmills, cycling machines, and rowers).

CONCLUSION

Home-based care interventions have advantages for stroke survivors, both physically and psychologically. The improvements were observed in the upper body motor function as well as reduced anxiety and depression. The home-based intervention has no serious adverse effect so it is safe to be conducted. The present systematic review highlights the importance of home-based interventions so this area opens an opportunity for nursing practice. Nurses can provide innovation, thereby presenting a possibility to implement caring at home especially for cases that need a long period of care like stroke.

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Conflict of interest

The authors have no financial conflict of interest.

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Supplementary data 1

Table 1. Summary of reviewed publications

No	Authors	Design	Sample size	Home intervention	Outcomes		Assessment Tools	Adverse effects
					Physical	Psychological		
1	Chaiyawat & Kulkantrakorn, 2012.	RCT.	60	Audiovisual materials (intervention group) or usual care without follow-up home visits (control group) in ischaemic stroke patients recovering for over 6 months. Health education provided if needed.	Activities of daily living (ADL).	• Depression and anxiety. • Dementia.	• The Barthel Index • Hospital Anxiety and Depression Scale • The Thai Mini-Mental State Examination (MMSE)	Minor.
2	Chaiyawat & Kulkantrakorn. 2012.	RCT.	60	A home rehabilitation program (home-based physical therapy, educational support, counseling, and audiovisual materials) compared with standard care (rehabilitation as prescribed by a physician and educational materials) in ischaemic stroke patients.	• Activities of Daily Living (ADL). • Degree of disability. • The dynamic of health-related quality of life.		• The Barthel Index. • Modified Rankin Scale. • EQ-5D utility index.	Minor.

3	Linder et al., 2015.	RCT.	96	Home-based robot-assisted rehabilitation, coupled with home exercise programs (HM+HEP), compared to a home exercise program alone (HEP).	• Upper extremity motor recovery. • Quality of life.	Depression.	• ARAT, Wolf Motor Function Test (WMFT), the Fugl-Meyer Assessment (FMA); • Centers for Epidemiologic Studies Depression Scale (CES-D); Modified Asworth Scale (MAS); and • The Stroke Impact Scale (SIS).	Not addressed
4	Mayo et al., 2013.	RCT.	87	Stationary cycling and an exercise compared with the walking program.	• Distance walking ability. • Other mobility and health issues. outcomes post-stroke • Health-related quality of life	Depression.	• The six-min walk test (6MWT). • Physical function: time in 5-meter walk, Berg Balance Scale, Community Balance. And Mobility Scale, SIS, RAND-36. • Euro-Qol 5. • GDS.	None
5	Dobkin et al., 2014.	RCT.	212	Locomotor Experience Applied Post-Stroke Trial (treadmill), compared to a Locomotor Training Program	• Walking capability • Quality of life and gait speed. • Exercise frequency		• SIS. • Exercise frequency (90 min sessions, 3 times per week) and duration (12 to 16 weeks) over 30	Not addressed.

				(LTP) delivered at 2 months (early-LTP [E-LTP]) or 6 months (late-LTP [L-LTP]) post-stroke in an outpatient facility with a Home Exercise Program (HEP), progressive flexibility, joint range of motion, upper-limb (UL) and lower-limb (LL) strengthening, coordination, and static and dynamic balance exercises over 2 months.			to 36 sessions. Can walk 10 feet with no more than one-person assistance, and 10 m walking speed of less than 0.8 m/s.	
6	Brunner et al., 2012.	RCT.	30	Modified constraint-induced movement therapy (mCIMT) compared to bimanual task-related training.	• Arm motor function • Hand dexterity, focusing on fine motor skills • Amount and quality of use of the affected arm in 30 daily life activities		• Action Research Arm Test • Nine-Hole Peg Test • Motor Activity Log	Not addressed
7	Ada et al., 2013.	RCT.	102	Treadmill and overground walking program	• Walking ability. • Walking	Community participation	• The Six-Min Walk Test • 10m walk test	Not addressed.

				compared to controls (no intervention).	speed, step length, and cadence • Health status • Walking self-efficacy and falls		• Euro-Qol, EQ-5D-3L • Falls efficacy scale, questionnaire • Adelaide Activities Profile	
8	Buss et al., 2015.	RCT.	113	Educational nursing intervention (counseling, information, training, and instruction) compared with control (usual care).	• Functional status • Quality of life (QoL) • Avoiding care dependency (CD)	• Self-efficacy • Cognitive status • Depression	• The Barthel Index • WHOQOL-BREF • Care Dependency Scale • General SE Scale • MMSE • Geriatric Depression Scale	Not recorded.
9	Mackenzie, Muir, &	RCT.	39	Non-speech oral-motor exercises (NSOMExs) for dysarthria.	• Speech intelligibility at the sentence level • Communication effectiveness in conversation • Lip and tongue movement tasks • Self-rating of communication effectiveness		• Speech Intelligibility Test (SIT). • Communication Effectiveness Measure (CEM). • Frenchay Dysarthria Assessment (FDA-2). • Communicative Effectiveness Survey (CES)	Not recorded.
10	Dean et al., 2014.	RCT.	68	Treadmill walking program and control (no intervention).	• Walking distance, fast walking speed • Health status		• Six-min walking test • Euro-Qol EQ-5D-3L	Not addressed.

11	Mares et al., 2014.	RCT.	52	Functional Strength Training (FST) upper limb (UL) or lower limb (LL).	• Upper limb function and Functional Ambulation Categories (FAC) for lower limb function. • Mobility • Hand dexterity		• The Action Research Arm Test (ARAT) • MRMI, Time up, and Go test • Nine-hole peg-test	Paretic limb pain.
12	Linder et al., 2013.	RCT.	99	Robotic-assisted home therapy (robot + HEP) compared to a home exercise program (HEP).	Health-related quality of life, (CES-D), motor, and non-motor outcomes.	Depression	SIS includes physical strength, memory, feeling, and emotion/mood, communication, ADL, IADLs, mobility, hand function and meaningful activities.	Not addressed.
13	Gordon.	RCT.	128	Community-based walking programs compared to light massage to the affected limbs.	• Health-related quality of life, • Activities of daily living • Functional exercise capacity/ endurance		• The Medical Outcomes Short Form, 36-Item Short-Form Health Survey (SF-36) • Barthel Index and Older Americans Resource and Services scale • 6-min walk test, resting heart rate, and Motricity Index for lower extremity strength.	No major adverse events.
14	Suat, Fatma & Nilgun, 2011.	Quasi-experiment.	14	Group A: tennis shoes only	• Weight-bearing • Cadence	Physiologic cost index	• Stabilometric platform	Not addressed.

				Group B: tennis shoes with dynamic ankle-foot orthoses (DAFOs).	• Ability to walk. • Velocity • Functional reach • Timed up and go, timed downstairs, timed upstairs	• The number of steps taken in 1 min. • Participant walked along a 15-m walkway; a record taken from the central 7-m. • Time that was used to walk 100 m on a walk test - using a manual chronometer. • Maximum distance reached forward while standing in a fixed position. • Time it took to stand from a sitting position, walk a 3 m distance, turn, walk back to the chair, and sit down. • Heart rate required for walking (heartbeats per meter).	
15	Page, Levine, & Hill, 2015.	Quasi-experiment.	5	Upper extremities hemiparesis patients received an 8-wk regimen consisting of 1 hour of mental	• Upper extremity improvement. • Upper extremity gross manual dexterity	• Fugl-Meyer Assessment. • Box and Block Test.	None.

				practice-triggered electrical stimulation every weekday. At the end of every 2-week period, participants attended supervised stimulation to progress therapeutic exercises and stimulation levels and monitor compliance.	• Activities of Daily Living (ADLs), Hand Function, and Overall Perception of Recovery domains of Stroke Impact Scale (SIS).			
16	Maier et al., 2014.	Quasi-experiment.	41	Virtual reality therapy, Rehabilitation Gaming System (gaming scenario resembling the popular 2 player air puck or air hockey game. The participant uses hand to hit a puck.		Enhance social functioning and acceptance of stroke patients.	Social interaction with family, and some ROM (Range of Motion).	Not addressed.
17	Dragert & Zehr, 2013.	Quasi-experiment.	19	High-intensity unilateral dorsiflexor resistance training: Isometric dorsiflexion program.	• Voluntary Isometric strength: dorsiflexion torque, muscle activation, reciprocal inhibition, walking ability. • Clinical		• Gait speed, kinematics, EMG patterns. • Time-up and Go, Timed 10-meter walk, Modified Asworth Scale, Functional Ambulation Category, Betg	Not addressed.

					function.	Balance Scale, and Fugl-Meyer.	
18	King et al., 2012.	Quasi-experiment.	3	Home-based bilateral upper limb rehabilitation using a motion-based computer game controller.	• Participant diaries of adherence to the intervention. • Upper limb physical functioning. • Improvement in motor function.	• Intrinsic Motivation Inventory (IMI) • Disabilities of Arm, Shoulder and Hand (DASH) questionnaire • The Fugl-Meyer-Upper Extremity (FMA), and Motor Assessment Scale (MAS).	None.
19	Low et al., 2015.	Quasi-experiment.	259	Transitional home-care program (medical and nursing care, patient education, and coordination of care with hospital specialists and community services).	• Hospital. • Emergency department attendance. • Length of stay in all hospitals.		Not addressed.
20	Suh et al., 2014.	Quasi-experiment.	16	Gait training divided into 2 groups: Group A: Rhythmic auditory stimulation (RAS) + gait training. Group B: gait training only	• Standing balance • Stride length, gait velocity, cadence, gait parameter of hemiplegic stroke patients.	• Posturography/ Biosway consisting of standing balance, overall stability index, the anteroposterior index, and the mediolateral index.	Not addressed.

				(15 min, 5x/week).			• 10 m walk test.	
21	Slijper et al., 2014.	Quasi-experiment.	11	Computer game-based training:	• Upper extremity motor function using WHAT. • Performing daily manual activities		• Fugl-Meyer, grip force (GrippitR) and arm function in the activity • (ARAT). • ABILHAND.	Not addressed.
22	Duncan et al., 2011.	Quasi-experiment.	408 participants	Body-weight support in treadmill stepping.	• An improved functional level of walking 1 year after stroke • Changes at 1 year in over distance of 10 m. • Fugl-Meyer Assessment of Leg Motor Recovery, the Berg Balance Scale, the Activities of Daily Living-Instrumental Activities of Daily Living (ADL-IADL) Scale, Activities-Specific Balance Confidence Scale, physical mobility and participation of the Stroke		• The ability to walk independently at a speed of 0.4 m per second or faster, or at a speed of 0.8 m per second to $<$ 0.8 m per second). • The distance walked in 6 min and the number of steps taken per day).	Multiple falls more common in the group with early locomotor training than in the other two groups (p = 0.02).

					Impact Scale, MMSE, Personal Health Questionnaire 9.			
23	Sullivan, Hurley, & Hedman, 2012.	Quasi-experiment.	38	Sensory amplitude electrical stimulation (SES) and repetitive task practice (sham), using the glove electrode.	• Measure active movement capacity and reflexes following stroke. • Measurement of quality and arm function on 14 daily tasks. • Perceptual Threshold Test-Electrical Stimulation (PTTES), Nottingham Stereognosis Assessment, Stroke Impact Scale-16, the Tardieu Scale of Spasticity.		• Fugl Meyer Assessment and Arm Motor Ability Test (AMAT). • The Motor Activity Log-14.	Not addressed.
24	Langstaff et al., 2014.	Quasi-experiment.	524	Intensive home-based rehabilitation services (enhanced discharge link (DL) rehabilitation services).	• Wait times for community rehabilitation. • Hospital LOS and readmission rates. • Functional outcomes.		FIM (Functional Independence Measurement).	Not addressed.
25	Levy et al., 2015.	Quasi-experiment.	26	Physical therapy via an in-home	• Functional outcomes	Mild cognitive dysfunction.	• FIM, The Quick Disabilities of	Not addressed.

				video or telerehabilitation program.	• Health-related quality of life • The 2-min walk test (2MWT), The Veterans RAND 12-Item Health Survey (VR-12), and satisfaction.		the Arm, Shoulder, and Hand measure (QuickDASH). • HRQoL. • The Montreal Cognitive Assessment (MoCA).	
26	Allen et al., 2014.	Quasi-experiment.	794	Community stroke rehabilitation teams (CSRTs).	• Functional outcomes. • Important consequences of stroke, specifically for those with mild to moderately severe stroke. • An individual returning to normal social activities after a traumatic illness. • The amount of assistance a caregiver provides to a dependent individual. • The emotional, social, and health-related outcomes of an individual providing informal care to someone	Psychosocial outcome.	• FIM. • Stroke Impact Scale. • Reintegration to Normal Living Index. • The Caregiver Assistance and Confidence Scale (CACS). • BCOS. • The Hospital Anxiety and Depression Scale	Not addressed.

					having experienced a stroke).			
27	Sivan et al., 2014.	Quasi-experiment	19	Robotic device home-based Computer-Assisted Arm Rehabilitation (hCAAR).	• Kinematic variables of arm movement, such as movement time, path length and jerk), • Record muscle power in different muscle groups of the paretic arms, • Spasticity (muscle stiffness) in the paretic upper limb, • Functional ability in daily activities and contribution of the affected upper limb in 13 real-life activities, • Perception of performance in actual daily life activities (ADL).		• Optotrak kinematic variables. • FuglMeyer Upper Extremity motor subscale (FM-UE), Action Research Arm Test (ARAT), the Medical Research Council (MRC). • Modified Ashworth Scale (MAS). • Chedoke Arm and Hand Activity Inventory (CAHAI). • Bilateral activities and ABILHAND.	Musculoskeletal adverse events included mild shoulder and wrist pain).

*RCT: Randomised Control Trial