The Effectiveness of Community-Based Interventions in Improving Activities of Daily Living and Quality of Life Outcomes in Persons Living with Stroke: A Systematic Review

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ABSTRACT

Purpose: *Despite the growth of literature regarding community-based interventions (CBI) in low- to middle-income and high-income countries, its effectiveness in improving outcomes related to activities of daily living (ADL) and quality of life (QOL) in people with stroke is inconclusive. This systematic review compared the effectiveness of community-based interventions with the usual or hospital-based treatments in improving ADL and QOL outcomes in this population.*

Method: *Four databases were systematically searched from inception until December 31, 2020, for relevant experimental studies from high-income and low- to middle-income countries that compared CBI with the usual/hospital rehabilitation on outcomes related to ADLs and QOL in clients with stroke.* ***Results:*** *All the 10 experimental studies that were included came from high-income countries (Italy, United Kingdom, South Korea, Canada, and Australia), involving 1575 participants (806 males, 656 females, 113 not classified) with age range from 22-103 years. Seven articles measured ADL performance, and 10 measured QOL. Results indicated that CBI generally demonstrates improvement in ADL and QOL values similar to usual or hospital-based care. There was wide variability in the interventions described and the outcome measures used for both groups. Risk of bias assessment revealed issues with randomisation, blinding and follow-up. Stroke-specific baseline characteristics such as length of time since diagnosis and laterality varied considerably in all of the studies.*

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Conclusion and Limitations: *CBI did not demonstrate significant difference in improving ADL and QOL outcomes for people with stroke compared to usual care, possibly due to the high quality of rehabilitation services existing in the countries where the studies took place. There is a need to use standardised outcome measures and interventions to ascertain these outcomes.*

Key words: *community-based intervention, community-based rehabilitation, activities of daily living, quality of life, stroke rehabilitation, rehabilitation*

INTRODUCTION

Stroke or cerebrovascular accident (CVA) is an acquired brain injury resulting from blockage or rupture of associated blood vessels in the brain. The condition can lead to complex impairments in physical and cognitive functions, resulting in restrictions in an individual's ability to perform basic activities of daily living (BADL) or instrumental activities of daily living (IADL) (Desrosiers et al., 2005; World Health Organisation, 2002). Environmental constraints such as lack of access to community services result in limited participation, feelings of abandonment and social isolation (Norrving & Kissela, 2013). Individuals living with stroke also experience depression (Norrving & Kissela, 2013; Tang, Sun, Pang, & Harris, 2018) and reduction in their perceived quality of life (QOL) (Desrosiers et al., 2005).

Stroke is the third leading cause of disability worldwide (Feigin, Norrving, & Mensah, 2017). The age-adjusted prevalence rate for stroke has increased to 299.1 per 100,000 people for ischaemic stroke and 116.6 per 100,000 people for haemorrhagic stroke globally, which is nearly double their value since 1990 (Feigin et al., 2015). In terms of years lived with disability (YLD) which is the health loss brought about by non-fatal conditions (Institute for Health Metrics and Evaluation, 2019; Mokdad et al., 2018), the age-standardised YLD rate percentage change in people with stroke increased by11.2% from 2007 to 2017 (James et al., 2018). This increase has been attributed to the continued progress in medical care for people recently diagnosed with stroke (Brainin, Teuschl, & Kalra, 2007; Gorelick, 2019; Muka et al., 2015; Wang & Langhammer, 2017). The global lifetime risk for stroke however was predicted to increase from 22.8% in 1990 to 24.9% in 2016 (Gorelick, 2019) due to population growth, ageing and unhealthy lifestyles (Ezejimofor et al., 2016; Yan et al., 2016). Therefore, disability related to stroke is steadily becoming an epidemic and the number of cases will rise further in the years to come.

Stroke is one of the main causes of overall disease burden in both high-income countries and low-to-middle income countries (HICs and LMICs) because of the increasing number of people living with stroke-related disability (Thrift et al., 2014). It is therefore important for countries to focus on minimising the resulting disability to reduce their economic burden. Multidisciplinary physical rehabilitation, in conjunction with medical care, has been shown to improve stroke-related functional outcomes (Langhorne, Bernhardt, & Kwakkel, 2011; Teasell, Foley, Hussein, & Cotoi, 2018). Organised multidisciplinary stroke units have been shown to significantly reduce death or dependency outcomes (odds ratio = 0.74; 95% confidence interval = 0.61 – 0.90; p = 0.002) (Stroke Unit Trialists' Collaboration, 2013). This approach to stroke rehabilitation is commonly used in HICs and is costly to administer. A client in the United States spends an average of 8,218 US dollars for post-acute rehabilitation (Agency for Healthcare Research and Quality, 2019). This trend of high-cost physical rehabilitation is also consistent among other developed countries, and consequently denies access to individuals who cannot afford it.

LMICs face a much greater challenge in setting up stroke units due to lack of specialists, facilities, and other system-level barriers (Bernhardt, Urimubenshi, Gandhi, & Eng, 2020; Bettger et al., 2019; Yan et al., 2016), resulting in limited availability of effective rehabilitation services (Bettger et al., 2019; Gimigliano & Negrini, 2017; World Health Organisation, 2019; Yan et al., 2016). The cost of travelling to rehabilitation facilities makes the service even more burdensome for people with stroke and their families. In one Malaysian study, the average total cost for outpatient rehabilitation services for the first three months was 547.10 US dollars, which is already a third of the client's combined average monthly income for three months (Hejazi, Mazlan, Abdullah, & Engkasan, 2015). A similar situation can also be inferred in the Philippines where 55.8% of health expenditures are out-of-pocket payments (Navarro, Baroque, Lokin, & Venketasubramanian, 2014; Philippine Health Insurance Corporation, 2014; Wong et al., 2017). Lack of access to affordable rehabilitative measures has been reported to result in decreased quality of life in people post-stroke (Choi-Kwon, Choi, Kwon, Kang, & Kim, 2006; Mahesh, Gunathunga, Jayasinghe, Arnold, & Liyanage, 2018). These challenges also make the burden of having stroke higher in LMICs than in HICs (Abegunde, Mathers, Adam, Ortegon, & Strong, 2007; Navarro et al., 2014; Yan et al., 2016).

The prohibitive cost and limited access to conventional stroke rehabilitation

has resulted in the development of other approaches to narrow the gap. One of these is to bring the treatment strategies into the home or community of people living with stroke; this is known as community-based intervention (CBI). CBI is delivered either to a set place within the community or at the residences of people with disability, with a single person or a group receiving the service at a time (Iemmi et al., 2015; Liu et al., 2020; Ryan, Enderby, & Rigby, 2006). CBI has been developed in both LMICs and HICs to provide people living with stroke continued rehabilitation services after discharge from hospital care, to augment limited healthcare services, and to promote strategies for the prevention of certain conditions (Iemmi et al., 2015; Johnson, Bird, Muthalib, & Teo, 2020; Magwood et al., 2020; Mannan et al., 2012; Yan et al., 2016).

CBIs are used by the government, health institutions and professionals, case managers or community workers (Bettger et al., 2019; Iemmi et al., 2015; Johnson et al., 2020; Mannan et al., 2012; Ryan et al., 2006). When community workers are involved, they usually undergo training prior to delivering the interventions (Jansen-van Vuuren & Aldersey, 2019; Mannan et al., 2012).

Community-based interventions in both LMICs and HICs are evolving; many studies describe various strategies and techniques being implemented, especially in stroke rehabilitation (Graven, Brock, Hill, & Joubert, 2011; Iemmi et al., 2015; Magwood et al., 2020; Yan et al., 2016). While many of the interventions designed for addressing the healthcare needs of people living with stroke are expected to be more evidence-based, specialised and expensive in HICs due to better healthcare systems, CBIs are not necessarily expensive as these are commonly developed to improve access to these services by stroke survivors (Jeong & Kim, 2007; WHO & World Bank, 2011). In fact, some of the CBIs developed in high-income countries have found their way into low- and middle-income countries. An example of this is early supported discharge (Langhorne & Widen-Holmqvist, 2007) which has been implemented in India and China (Yan et al., 2016). Inexpensive CBIs developed in either LMICs or HICs have been instrumental in providing people living with stroke the means to access their healthcare needs, especially when provided within the context of community-based rehabilitation (CBR).

However, very little is written about the impact of CBI delivered within the CBR approach on the performance of Activities of Daily Living (ADL) and QOL of people living with stroke (Cleaver & Nixon, 2014). Five reviews of CBIs in LMICs showed that there is potential benefit for community-based interventions to improve functional outcomes for people with disabling conditions living

within these countries (Bowers, Kuipers, & Dorsett, 2015; Cleaver & Nixon, 2014; Finkenflügel, Wolffers, & Huijsman, 2005; Iemmi et al., 2015; Yan et al., 2016), but only a few of the studies included in these reviews discussed the direct effect of CBI on the ADL performance and QOL of people with stroke. Majority of these studies on CBI are also of poor rigour and quality, thereby making the claims about the effectiveness of CBI delivered in LMICs inconclusive (Bowers et al., 2015; Iemmi et al., 2015). The lack of randomised controlled trials (RCTs) suggests the limited capacity of LMICs to conduct healthcare-oriented research (Bowers et al., 2015; Iemmi et al., 2015) possibly due to lack of interest of researchers and universities in such studies (Feng et al., 2013).The costs and training associated with conducting research and the lack of funding could have fuelled this lack of interest, or there might be some other independent reason (Bettger et al., 2019; Bowers et al., 2015; Pandian, Liu, Gandhi, & Lindley, 2017). This necessitates serious attention because CBI is provided as a rehabilitation service within the CBR framework, and the number of people with stroke who will need rehabilitation is expected to increase (Feigin et al., 2017; Magwood et al., 2020).

In addition, there is no study that has summarised the impact of CBIs applicable for LMICs on ADL performance and QOL of persons living with stroke, despite the steady growth of research concerning the effect of CBI among functional outcomes of stroke survivors within HICs (Graven et al., 2011; Magwood et al., 2020).

Objective

The growing need for effective and accessible approaches to improve the function of people living with stroke is an important issue that affects both HICs and LMICs (Bernhardt et al., 2020; WHO & World Bank, 2011), despite their differing healthcare service capacity and socio-political environments. The current systematic review was undertaken to identify CBIs for people living with stroke in HICs that are accessible in LMICs and LMICs as well, and then compare their effectiveness with usual care offered through multidisciplinary stroke units in improving ADL and QOL outcomes of stroke survivors.

METHOD

Data Sources and Searches

The Preferred Reporting Items for Systematic Reviews and Meta-analyses

(PRISMA) statement was used as a guide in the research process (Liberati et al., 2009; Moher, Liberati, Tetzlaff, & Altman, 2010). A Health Sciences librarian helped develop the search strategy. The following databases were used for the search: PubMed, Science Direct, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Scopus. The search terms used a combination of the following words: "community-based", "stroke" (or CVA), "routine" ("usual", or "hospital"), "activities" (or ADL), and "quality of life" (see Figure 1) depending on the search protocol of the databases. Search was conducted from October 18, 2018, to December 31, 2020. Push notifications were included to alert the researcher to new articles that matched the criteria.

Figure 1. Search terms used in PubMed.

#1: (stroke OR CVA OR cerebrovascular)

#2: (cbr OR "community based" OR "community-based" OR community)

#3: ((hospital based OR hospital-based) OR typical OR conventional OR standard OR usual)

#4: ((qol OR quality of life) OR (adl OR (activity OR activities)))

#5: (Randomized Controlled Trial [pt] OR Pragmatic Clinical Trial [pt] OR Controlled Clinical Trial [pt] OR Clinical Trial [pt] OR Clinical Study [pt] OR trial [tw] OR study [tw])

#6: (#2 AND #3)

#7: (#6 AND #1)

#8: (#7 AND #4)

#9: (#8 AND #5)

#10: ((Community Medicine [mh] OR Therapeutic Community [mh] OR Community Integration [mh] OR Community Health Services [mh] OR Community Networks [mh] OR Hospitals, Community [mh]))

#11: Stroke Rehabilitation [mh] OR ((Stroke [mh] OR stroke [ti] OR CVA [ti] OR cerebrovascular [ti] OR cerebrovascular [tw] OR stroke [tw]) AND rehabilitation)

#12: (Quality of Life [mh] OR qol [tw] OR "quality of life" [tw]) OR (Activities of Daily Living [mh] OR adl [tw] OR activity of daily living [tw] OR activities of daily living [tw] OR (activities OR activity))

#13: (Rehabilitation Centers [mh] OR Rehabilitation Research [mh] OR Stroke Rehabilitation [mh] OR Rehabilitation [mh] OR Hospitals [mh] OR (typical OR conventional OR standard OR usual))

#14: (#10 AND #13)

#15: (#14 AND #11)

#16: (#15 AND #12)

#17: (#8 AND #16)

The search criteria were as follows:

(1) Mention of "community-based" or "community rehabilitation" (or similar terms) in either the title, abstract or key words;

(2) Experimental studies or systematic reviews involving people with stroke and using usual or hospital care as comparison; and,

(3) The outcomes assessed in the study must include ADL (BADL or basic activities of daily living, IADL or instrumental activities of daily living, or combined) and/ or QOL.

Studies that were excluded were:

(1) Non-intervention studies and articles in languages other than English;

(2) All studies whose title and full text described CBI that focuses on advanced and/ or expensive technology that is not commonly available in LMICs (e.g., robots, virtual reality requiring specialised equipment, and treadmill with body weight support),

(3) Studies that were not completely performed within the community, or requiring clinical or hospital facilities; and,

(4) Articles published prior to 1979.

All trials comparing any intervention that is described as "community-based" for physical rehabilitation with usual or routine care and including people with stroke as participants, were included in this study.

"Community-based" was defined as either the house of the participants or facilities that are already present within their community (e.g., gyms, community or town halls, recreation centres). "Intervention" in this study included any management focusing on health, education, or social aspects of people living with stroke, that attempts to improve their functional outcomes. This may include rehabilitation, exercise, counselling, training programmes and other approaches that can be delivered to one person at a time or to a group. In addition, the term "routine" and its synonyms "standard", "conventional" and "usual", and "hospital" were used for the comparison group, to ensure that all conventional modes of rehabilitation service delivery were included in this study.

The outcomes of interest included ADL performance and QOL scores. "Basic activities of daily living" (BADL) refer to the performance of tasks related to

self-care, such as hygiene, eating, dressing, toileting and transfers (Costa Filho, Mambrini, Malta, Lima-Costa, & Peixoto, 2018; Spector & Fleishman, 1998). "Instrumental activities of daily living" (IADL) are those that must be performed to be able to stay within the community, such as shopping, transportation, gardening, housework and community ambulation (Oort et al., 2019). "Quality of life" (QOL) was defined as an individual's personal appraisal of one's place in life, in culture and in the value system where one lives and where one makes relationships to objectives, standards or interests (Beslerová & Dzuričková, 2014).

Study Selection

Duplicate copies and articles in foreign languages were removed during the title and abstract screening. The screening of the remaining articles was systematically performed by the authors to identify those that satisfied the inclusion criteria. The reference list of all the included articles was also examined for additional articles. All the articles that met the set criteria were assessed for quality using the Physiotherapy Evidence Database (PEDro) and the modified Downs and Black scale (mDBs) (Hooper, Jutai, Strong, & Russell-Minda, 2008). Only those that received a rating of fair or higher (score of 15 or higher) in mDBS were considered for the synthesis of results.

Data Extraction Process

The authors summarised and synthesised the data into a Microsoft Excel® spreadsheet using the appraisal tool developed from the Cochrane Handbook (Higgins & Green, 2011). The following information was collected: study design, country of study, baseline characteristics of the participants, details of intervention and control groups, duration of follow-up, and outcome results. The economic status of the country of study was determined as "high-income" or "low- to middle-income" based on the World Economic Situation and Prospects (WESP) 2019 criteria (United Nations, 2019). The groups were then described using the intervention they received. The community-based intervention received by the experimental group was further categorised based on the type of intervention provided (health, education, social intervention). When described in the selected studies, the facilitators and decision-makers in treatment, extent of collaboration and participation among stakeholders were also included, to allow for a clearer description of these interventions. Exercise interventions were further identified using the Frequency, Intensity, Time and Type (FITT) equation. The duration of

follow-up assessment was described in weeks or months.

The summary measures of interest for data synthesis were the pre-test and post-test values of both groups on all outcome results for ADL performance and QOL, including mean or mean change and standard deviations. Whenever appropriate, the authors of the selected articles were contacted via e-mail, to request missing information.

Risk of Bias Assessment

The selected articles were subjected to risk of bias assessment using the Physiotherapy Evidence Database (PEDro) and the modified Downs and Black rating. The PEDro scale is a widely used and valid 11-item risk of bias assessment tool for assessing RCTs (Elkins, Herbert, Moseley, Sherrington, & Maher, 2010; Macedo et al., 2010). A PEDro score for each article was either obtained from pedro.org.au or generated by the authors. The modified Downs and Black rating is a valid and reliable 27-item checklist used for a more comprehensive assessment of both randomised and non-randomised trials (Downs & Black, 1998). One of the authors (RT) and an independent reviewer separately scored each article using the mDBS criteria and discussed the results. Any unresolved inconsistencies were then sent to a research expert for arbitration. The use of both PEDro and modified Downs and Black checklists ensured fair estimation of bias for the selected articles. Assigning the level of evidence for all included studies is a necessary step in systematic reviews, as weighing the results of conflicting studies through their methodological quality ensures objectivity of drawn conclusions and allows decision-makers to be aware of the individual study's potential limitations (Centre for Evidence-based Medicine, 2016; Cotoi, Teasell, & EBRSR Research Group, 2018).

Data Synthesis and Analysis

Two healthcare statisticians assisted in the analysis of the quantitative data for this study. Estimates of mean and standard deviations were obtained based on statistical tools provided by Cochrane Handbook version 5.1.0 (Higgins & Green, 2011) and Hozo, Djulbegovic and Hozo (2005). Studies receiving a PEDro score of 6 or more are considered as "good quality" (Hahne, Ford, & McMeeken, 2010). For modified Downs and Black, a score of at least 20 was considered as "good", 15 to 19 as "fair", and at most 14 as "poor" (Hooper et al., 2008). Level of evidence was assigned for each study using the Centre for Evidence-Based Medicine

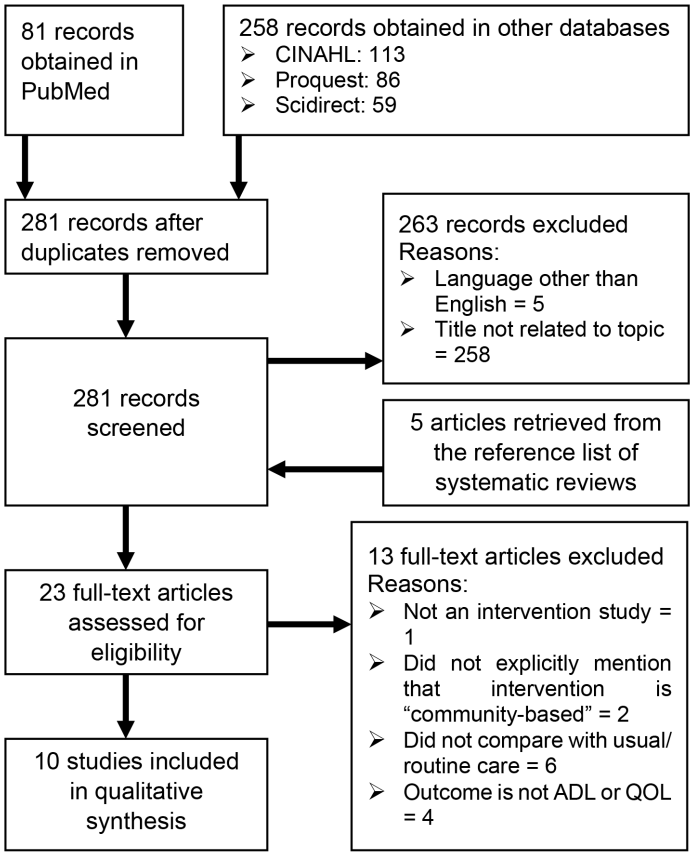
(CEBM) criteria for studies concerning treatment (CEBM, 2016), based on the type and quality of study and the confidence interval of the results. The highest level that could be obtained was '1a', and downgrading was done if the article failed to meet any of the criteria mentioned above. Meta-analysis was considered for outcomes when there were at least 3 studies using the same outcome measure (Cheung & Vijayakumar, 2016).

RESULTS

Study Selection

Of the 344 articles reviewed, 10 articles were included in this study. Title and abstract review removed 263 articles, and full text review removed an additional 13 articles (see Figure 2).

Figure 2. PRISMA flow diagram.



Description of Included Studies

Tables 1 and 2 below contain a summary of the details of included studies. All of the studies were published from 1997 to 2014 (17 years) and involved a total of 1,575 participants (806 males, 656 females, 113 not classified). Six were RCTs, while the rest were quasi-experimental. Five studies were graded '1b' and five studies were graded '2b' using the CEBM criteria. Also, all 10 studies came from high-income countries (Italy, United Kingdom, Canada, Australia, and South Korea). Participants were reported to be similar at baseline across all these studies; however, only age was reported consistently. Other baseline characteristics were not consistently reported, such as gender distribution (9 out of 10) and time elapsed since stroke diagnosis (5 out of 10 studies).

Table 1. Summary characteristics of studies included.

Author and Year	Country of Study	Sample Size	Duration of Study	Outcome Measures Used	Selection Criteria	Baseline Characteristics
Benvenuti et al (2014)	Italy	188	3 months	➢ **ADL:** NEADL, BI ➢ **QOL:** SIS	Inclusion: ➢ Duration post-stroke: ≥ 3 months ➢ Age: ≥ 40 y/o ➢ Paretic limb function: ≥ 3 Enjalbert Scale ➢ Permission from primary care giver Exclusion: ➢ Cognitive dysfunction ➢ Symptomatic congestive heart failure ➢ Unstable angina ➢ Under oxygen therapy ➢ Recent MI or hospitalization ➢ Pain interfering with exercise ➢ Poorly controlled BP	Age: 45 – 93* Sex: 102 Male, 86 Female Time Elapsed Since Stroke (y): 2.1 – 5.2*
Donnelly et al (2004)	United Kingdom	113	12 months	➢ **ADL:** NEADL, BI ➢ **QOL:** EQ5D, SF36, QOL	➢ Duration post-stroke: 4 weeks ➢ Potential to benefit from further rehabilitation ➢ Not a resident in a nursing or residential home ➢ No pre-existing physical or mental disability that makes further rehabilitation inappropriate	Age: 59 – 91* Sex: not indicated Time Elapsed Since Stroke (y): not indicated
Harrington et al (2010)	United Kingdom	243	12 months (ADL) 9 weeks (QOL)	➢ **ADL:** RMI, FAI ➢ **QOL:** WHOQOL-BREF	Inclusion: ➢ Age: >50 y/o at onset of stroke ➢ Returned to community > 3 months ➢ Able to participate in group activities Exclusion: ➢ Living in nursing homes	Age: 50 – 92* Sex: 132 Male, 111 Female Time Elapsed Since Stroke (y): not indicated

Jeong & Kim (2007)	South Korea	33	8 weeks	➢ **ADL:** None ➢ **QOL:** K-SSQOL	➢ Duration post-stroke: ≥ 6 months ➢ Muscle strength test: 2–4 (poor to moderate) ➢ Disability on one side of the body ➢ No history of rehabilitation ➢ Intact auditory function ➢ Ability to communicate	Age: 44 – 76* Sex: 23 Male, 10 Female Time Elapsed Since Stroke (y): 0.9 – 10*
Lincoln et al (2003)	United Kingdom	421	6 months	➢ **ADL:** NEADL, mBI ➢ **QOL:** EQ5D	Inclusion: ➢ Duration post-stroke: < 2 years ➢ Age: > 16 years ➢ Needs intervention from more than one rehabilitation discipline Exclusion: ➢ Lived outside the geographical area of the study or had been treated by the community stroke team in the previous two years	Age: 22 – 101 Sex: 222 (Male), 199 (Female) Time Elapsed Since Stroke: not indicated
Markle-Reid et al (2011)	Canada	101 (baseline)	12 months	➢ ADL: None ➢ QOL: SIS, SF-36	➢ Duration post-stroke: ≤ 18 months ➢ Newly referred to (< 2 weeks) and eligible for home care services ➢ Living in the community ➢ Mentally competent to give informed consent (or with substitute decision-maker) ➢ Competent in English (or with an interpreter available)	Age: 42 – 101* Sex: 45 (Male), 37 (Female) Time Elapsed Since Stroke: ≤ 6 months (57 out of 82)
Patterson et al (2010)	Australia	43	3 months	➢ **ADL:** None ➢ **QOL:** EQ5D	Inclusion: ➢ Community dwellers with a confirmed diagnosis of stroke Exclusion: ➢ Unable to answer the questionnaires due to cognitive/ language deficit	Age: 44 – 89* Sex: 25 (Male), 18 (Female) Time Elapsed Since Stroke: 1.2 – 9*
Rudd et al (1997)	United Kingdom	331	12 months	➢ **ADL:** RADL ➢ **QOL:** NHP	Inclusion: ➢ Able to perform functional independent transfer (if alone) ➢ Able to perform transfer with assistance (if with a willing caregiver) Exclusion: ➢ Living too far away	Age: 27 – 103 Sex: 185 (Male), 146 (Female) Time Elapsed Since Stroke: not indicated
Stuart et al (2009)	Italy	93 (baseline)	6 months	➢ **ADL:** BI ➢ **QOL:** SIS	➢ Age: ≥ 40 y/o ➢ Duration post-stroke: > 9 months ➢ Function: ability to walk independently for 6 minutes at a velocity ≥30 - 90 cm/s, either with or without an assistive device ➢ No comorbid conditions that are contraindications to exercise participation	Age: 49 – 91* Sex: 54 (Male), 24 (Female) Time Elapsed Since Stroke (y): 0 – 9*
Wolfe et al (2000)	United Kingdom	43	12 months	➢ **ADL:** mBI ➢ **QOL:** NHP	➢ All patients who remained at home after stroke onset	Age: 48 – 96* Sex: 18 (Male), 25 (Female) Time Elapsed Since Stroke: not indicated

* - estimated based on 2SD (age), 1SD (stroke duration)

Table 2. Summary of risk of bias assessment.

Author and Year	Type of Study	Level of Evidence (CEBM)	Risk of Bias Assessment	Statistical Analysis Employed
Benvenuti et al (2014)	Quasi-experimental	2b	➢ **Downs and Black:** 17 ➢ **PEDro Score:** 2	➢ Per protocol
Donnelly et al (2004)	RCT	1b-	➢ **Downs and Black:** 18 ➢ **PEDro Score:** 6*	➢ Per protocol
Harrington et al (2010)	RCT	1b-	➢ **Downs and Black:** 21 ➢ **PEDro Score:** 8*	➢ Intention-to-treat
Jeong & Kim (2007)	RCT	1b-	➢ **Downs and Black:** 19 ➢ **PEDro Score:** 5*	➢ Per protocol
Lincoln et al (2003)	Quasi-experimental	2b	➢ **Downs and Black:** 19 ➢ **PEDro Score:** 4*	➢ Per protocol
Markle-Reid et al (2011)	RCT	1b-	➢ **Downs and Black:** 20 ➢ **PEDro Score:** 6*	➢ Per protocol
Patterson et al (2010)	Quasi-experimental	2b	➢ **Downs and Black:** 17 ➢ **PEDro Score:** 5	➢ Intention-to-treat
Rudd et al (1997)	RCT	1b-	➢ **Downs and Black:** 21 ➢ **PEDro Score:** 7*	➢ Per protocol
Stuart et al (2009)	Quasi-experimental	2b	➢ **Downs and Black:** 16 ➢ **PEDro Score:** 3	➢ Per protocol
Wolfe et al (2000)	RCT	1b-	➢ **Downs and Black:** 21 ➢ **PEDro Score:** 7*	➢ Intention-to-treat

* - pre-appraised in PEDro website (https://pedro.org.au/)

Various interventions were utilised in each group across the included studies; these are summarised in Table 3. For the CBI group, 5 studies used coordinated professional rehabilitation services from at least a physical therapist (PT), occupational therapist (OT), and speech language therapist (SLT). Rehabilitation services were delivered by either a multidisciplinary team that holds regular meetings to coordinate their services (Donnelly, Power, Russell, & Fullerton, 2004; Lincoln, Walker, Dixon, & Knights, 2004; Rudd, Wolfe, Tilling, & Beech, 1997; Wolfe, Tilling, & Rudd, 2000) or an interdisciplinary team that develops an integrated and individualised plan of care (Markle-Reid et al., 2011). Two studies used exercise classes facilitated by local exercise instructors supported by a physiotherapist (Harrington et al., 2009; Stuart et al., 2009), two studies used exercise combined with peer support (Patterson, Ross-Edwards, & Gill, 2010) or music (Jeong & Kim, 2007), and one study used telerehabilitation (Benvenuti et al., 2014).

Table 3. Details of intervention and results of key outcome measures assessed.

Study and Year	Details	ADL	QOL
Benvenuti et al 2014	*Intervention Group* ➢ 3 sessions therapist, 2 sessions Habilis program (adjusted depending on patient assessment) ➢ Decision-maker: Health professional ➢ Focus (CBR Matrix): Health ➢ Sample size: 143 *Control Group* ➢ Outpatient or no management ➢ Sample size: 45	*Pretest* ➢ NEADL Usual: 14 (SD: 5.37); NEADL Community: 13.2 (SD: 5.98) ➢ BI Usual: 87.4 (SD: 12.07); BI Community: 85.1 (SD: 15.55) *Posttest* ➢ NEADL Usual: 13.7 (2.01); NEADL Community: 17.31 (3.59) ➢ BI Usual: 86.9 (3.35); BI Community: 89.5 (9.57) *Significant difference?* ➢ NEADL: Yes ➢ BI: Yes	*Pretest* ➢ Not reported *Posttest* ➢ SIS Communication Usual: 0.3 (SD: 4.02); SIS Communication Community: 2.6 (SD: 10.76) ➢ SIS ADLs Usual: 0.2 (SD: 6.04); SIS ADLs Community: 5.7 (SD: 26.31) ➢ SIS Mobility Usual: -0.8 (SD: 7.38); SIS Mobility Community: 5.6 (SD: 23.92) ➢ SIS Manual Dexterity Usual: -1.1 (SD: 6.71); SIS Manual Dexterity Community: 7.3 (SD: 13.15) ➢ SIS Participation Usual: 2.2 (SD: 12.07); SIS Participation Community: 3.0 (SD: 11.96) *Significant difference?* ➢ SIS Communication: No ➢ SIS ADLs: Yes ➢ SIS Mobility: Yes ➢ SIS Manual Dexterity: Yes ➢ SIS Participation: No

Donnelly et al 2004	*Intervention Group* ➢ Home visit x 45 minutes x 2.5/week, multidisciplinary meetings involving patient and closest relative ➢ Decision-maker: Health professionals ➢ Focus (CBR Matrix): Health ➢ Sample size: 59 *Control Group* ➢ Hospital-based ➢ Sample size: 54	*Pretest* ➢ NEADL Hospital: 5.77 (4.79); NEADL Community: 4.95 (5.39) ➢ BI Hospital: 13.89 (3.93); BI Community: 14.14 (3.38) *Posttest* ➢ NEADL Hospital: 10.43 (5.92); NEADL Community: 12 (6.34) ➢ BI Hospital: 17.15 (3.81); BI Community: 17.98 (3.10) *Significant difference?* ➢ NEADL: No ➢ BI: No	*Pretest* ➢ EQ5D Hospital: 59.17 (16.15); EQ5D Community: 60.48 (18) ➢ SF-36 Physical Functioning Hospital: 35.35 (7.2); SF-36 Physical Functioning Community: 35.04 (7.72) ➢ QOL Hospital: 16.53 (3.65) ➢ QOL Community: 17.67 (4.14) *Posttest* ➢ EQ5D Hospital: 68.21 (20.31); EQ5D Community: 66.36 (18.45) ➢ SF-36 Physical Functioning Hospital: 34.67 (32.01) ➢ SF-36 Physical Functioning Community: 35.59 (31.32) ➢ QOL Hospital: 18.92 (4.74); QOL Community: 18.57 (4.29) *Significant difference?* ➢ EQ5D: No ➢ SF-36 Physical Functioning: No ➢ QOL: No
Harrington et al 2010	*Intervention Group* ➢ Group exercise: 1-hour circuit training for balance, endurance, strength, flexibility, function and well-being) and interactive education in leisure and community centers x 2/week ➢ Decision-makers: Local exercise instructors supported by PT ➢ Focus (CBR Matrix): Health ➢ Sample size: 119 *Control Group* ➢ Referral information about usual services ➢ Sample size: 124	*Pretest* ➢ BI Control: 19 (2.22); BI Community: 18 (3.70) ➢ FAI Control: 20 (11.22); FAI Community: 15.5 (16.49) ➢ RMI Control: 12 (11.36); RMI Community: 11 (8.24) *Posttest* ➢ BI: not reported ➢ FAI Control: 21 (8.28); FAI Community: 17 (15.76) ➢ RMI Control: 12 (8.31); RMI Community: 12 (5.23) *Significant difference?* ➢ FAI: No ➢ RMI: No	*Pretest* ➢ WHOQol-Bref Physical Control: 53.6 (19.20) ➢ WHOQol-Bref Physical CBR: 53.6 (28.3) ➢ WHOQol-Bref Social Control: 66.7 (35.84) ➢ WHOQol-Bref Social CBR: 58.3 (36.5) *Posttest* ➢ WHOQol-Bref Physical Control: 53.6 (22.26) ➢ WHOQol-Bref Physical CBR: 57.1 (56.20) ➢ WHOQol-Bref Social Control: 66.7 (34.08) ➢ WHOQol-Bref Social CBR: 66.7 (26.79) *Significant difference?* ➢ EQ5D: No ➢ SF-36 Physical Functioning: No ➢ QOL: No

Jeong and Kim 2007	*Intervention Group* ➢ RAS music-movement (repetitive, rhythmic movements) x 2/ week ➢ Decision-makers: Health professionals ➢ Focus (CBR Matrix): Health ➢ Sample size: 16 *Control Group* ➢ Referral information about usual services ➢ Sample size: 17	None	*Pretest* ➢ K-SSQOL Control: 2.54 (0.80); K-SSQOL Community: 3.25 (1.08) *Posttest* ➢ K-SSQOL Control: 2.92 (0.90); K-SSQOL Community: 3.58 (0.87) *Significant difference?* ➢ K-SSQOL: No
Lincoln et al 2003	*Intervention Group* ➢ Treatment delivered by multidisciplinary team of PT, OT, SLP, Mental health nurse, and Rehabilitation support worker ➢ Decision-makers: Health professionals ➢ Focus (CBR Matrix): Health ➢ Sample size: 189 *Control Group* ➢ Outpatient or hospital-based ➢ Sample size: 232	*Pretest* ➢ not reported *Posttest* ➢ BI Routine: 16 (5.19); BI Community: 16 (4.44) ➢ NEADL Routine: 25.5 (20.74); NEADL Community: 24 (18.52) *Significant difference?* ➢ BI: No ➢ NEADL: No	*Pretest* ➢ Not reported *Posttest* ➢ EQ5D Routine: 55 (23.70); EQ5D Community: 52 (27.41) *Significant difference?* ➢ EQ5D: No

Markle-Reid et al 2011	*Intervention Group* ➢ Regular home visits, screening, risk factor modification, education, caregiver support, referral and linkage to health and social services, monthly case conferencing, and evidence-based community reintegration plan by interprofessional team of care coordinator, nurse, PT, OT, SLP, dietitian, social worker, personal support worker ➢ Decision-makers: Health professionals ➢ Focus (CBR Matrix): Health ➢ Sample size: 52 *Control Group* ➢ Routine follow-up, referral information and private care ➢ Sample size: 49	None	*Pretest* ➢ SIS-16 Usual: 60.86 (21.59); SIS-16 Community: 54.58 (25.71) ➢ SF-36 Physical Function Usual: 32.82 (25.20); SF-36 Physical Function Community: 26.94 (27.23) ➢ SF-36 Role-Physical Usual: 36.46 (28.18); SF-36 Role-Physical Community: 28.39 (30.58) ➢ SF-36 Social Functioning Usual: 56.41 (32.43); SF-36 Social Functioning Community: 54.65 (35.78) *Posttest* ➢ SIS-16 Usual: 60.36 (22.94); SIS-16 Community: 52.74 (30.59) ➢ SF-36 Physical Function Usual: 28.85 (28.48); SF-36 Physical Function Community: 28.84 (30.68) ➢ SF-36 Role-Physical Usual: 50.33 (28.21); SF-36 Role-Physical Community: 47.14 (35.22) ➢ SF-36 Social Functioning Usual: 59.29 (30.71); SF-36 Social Functioning Community: 66.57 (34.69) *Significant difference?* ➢ SIS -16: No ➢ SF-36 Physical Function: No ➢ SF-36 Role-Physical: No ➢ SF-36 Social Functioning: No
Patterson et al 2010	*Intervention Group* ➢ Exercise training and peer support (sharing accounts of personal experience and adjustments to daily life) supervised by OT and PT x weekly ➢ Decision-makers: Health professionals ➢ Focus (CBR Matrix): Health ➢ Sample size: 22 *Control Group* ➢ Class (Group discussion) ➢ Sample size: 21	None	➢ EQ5D: F[1,36]-0.032 Significant difference? ➢ EQ5D: No

Rudd et al 1997	*Intervention Group* ➢ Domiciliary care added to conventional care x maximum one daily visit from each therapist; facilitated by team of PT, OT, SP ➢ Decision-makers: Health professionals ➢ Focus (CBR Matrix): Health ➢ Sample size: 167 *Control Group* ➢ Stroke unit, medical/ elderly care ward, outpatient: hospital or domiciliary, usual community resources ➢ Sample size: 164	*Pretest* ➢ BI Conventional: 15 (4); BI Community: 15 (4) ➢ Rivermead ADL: not reported *Posttest* ➢ BI Conventional: 16 (4); BI Community: 16 (4) ➢ Rivermead ADL Conventional: 27 (11); Rivermead ADL Community: 27 (12) *Significant difference?* ➢ BI: No ➢ RADL: No	*Pretest* ➢ NHP Conventional: 10 (7); NHP Community: 11 (7) *Posttest* ➢ NHP Conventional: 12 (8); NHP Community: 14 (9) *Significant difference?* ➢ NHP: No
Stuart et al 2009	*Intervention Group* ➢ 1-hour APA-stroke exercise class x 3/ week x gymnasium and home ➢ Decision-makers: Health professionals ➢ Focus (CBR Matrix): Health ➢ Sample size: 49 *Control Group* ➢ Medical care ➢ Sample size: 44	*Pretest* ➢ BI Control: 85.4 (SD: 13.27); BI Community: 79.5 (SD: 18.2) *Posttest* ➢ BI Control: 86.1 (SD: 6.63); BI Community: 83.4 (SD: 11.9) *Significant difference?* ➢ BI: No	*Pretest* ➢ SIS communication Control: 88.3 (SD: 19.24); SIS communication Community: 74.6 (SD: 28.7) ➢ SIS mobility Control: 80.7 (SD: 21.23); SIS mobility Community: 68.9 (SD: 18.2) ➢ SIS participation Control: 61.5 (SD: 28.52); SIS participation Community: 59.4 (SD: 23.1) *Posttest* ➢ SIS communication Control: 89.5 (SD: 13.27); SIS communication Community: 81.8 (SD: 21) ➢ SIS mobility Control: 78.3 (SD: 13.93); SIS mobility Community: 75.7 (SD: 17.5) ➢ SIS participation Control: 52.3 (SD: 21.23); SIS participation Community: 71 (SD: 23.1) *Significant difference?* ➢ SIS Communication: No ➢ SIS Mobility: No ➢ SIS Participation: Yes

Wolfe et al 2000	*Intervention Group* ➢ Maximum of one daily visit by each therapist with consultant coordinating team of PT, OT, SLP, and therapy aide ➢ Decision-makers: Health professionals ➢ Focus (CBR Matrix): Health ➢ Sample size: 23 *Control Group* ➢ Hospital or domiciliary outpatient care, usual community resources ➢ Sample size: 20	Pretest ➢ BI usual: 15.5 (SD: 3); BI rehabilitation: 15.25 (SD: 3.25)/ Posttest ➢ BI usual: 19 (SD: 1); BI rehabilitation: 16 (SD: 3) *Significant difference?* ➢ BI: No	Pretest ➢ NHP usual: 12.75 (SD: 7.25); NHP rehabilitation: 13 (SD: 7); Posttest ➢ NHP usual: 12.5 (SD: 6.5); NHP rehabilitation: 9.5 (SD: 7) *Significant difference?* ➢ NHP: No

The comparison group also received different interventions. In 6 studies, medical care or rehabilitation in the hospital or clinics was utilised (Benvenuti et al., 2014; Donnelly et al., 2004; Lincoln et al., 2004; Rudd et al., 1997; Stuart et al., 2009; Wolfe et al., 2000). Two studies utilised the service of care coordinators who managed the overall rehabilitation care of participants, besides providing them with information sheets (Harrington et al., 2009; Markle-Reid et al., 2011). These coordinators determined the eligibility of people with stroke for professional and non-professional services, prior to arranging and coordinating with the providers (Markle-Reid et al., 2011). One study used peer support services conducted at a local community hall (Patterson et al., 2010) and another study used referral services about the usual care available in their community (Jeong & Kim, 2007).

There are also differences on the temporal aspects of the included articles. Time elapsed since stroke diagnosis ranged from less than 6 months to approximately 10 years. Regarding the follow-up testing, one study conducted follow-up after 2 months (Jeong & Kim, 2007), one study after 9 weeks (Harrington et al., 2009), two studies after 3 months (Benvenuti et al., 2014; Patterson et al., 2010), two studies after 6 months (Lincoln et al., 2004; Stuart et al., 2009), and five studies after 12 months (Donnelly et al., 2004; Harrington et al., 2009; Markle-Reid et al., 2011; Rudd et al., 1997; Wolfe et al., 2000).

Review of the modified Downs and Black checklist scores showed that 6 studies

received "fair" rating (Benvenuti et al., 2014; Donnelly et al., 2004; Jeong & Kim, 2007; Lincoln et al., 2004; Patterson et al., 2010; Stuart et al., 2009) and 4 studies received "good" rating (Harrington et al., 2009; Markle-Reid et al., 2011; Rudd et al., 1997; Wolfe et al., 2000). Analysis of the items further revealed that many of the included studies have issues with the reporting of principal confounders (Donnelly et al., 2004; Harrington et al., 2009; Lincoln et al., 2004; Markle-Reid et al., 2011; Patterson, 2010; Rudd et al., 1997), presence of adverse effects (Donnelly et al., 2004; Harrington et al., 2009; Jeong & Kim, 2007; Lincoln et al., 2004; Markle-Reid et al., 2011; Patterson, 2010; Wolfe et al., 2000), and comparison of baseline characteristics of consenters and non-consenters (Donnelly et al., 2004; Harrington et al., 2009; Jeong & Kim, 2007; Lincoln et al., 2004; Markle-Reid et al., 2011; Patterson, 2010; Rudd et al., 1997; Stuart et al., 2009; Wolfe et al., 2000). Studies that used multidisciplinary approaches were also unable to clearly report the intervention. These 4 studies (Donnelly et al., 2004; Lincoln et al., 2004; Rudd et al., 1997; Wolfe et al., 2000) have unclear descriptions of the community-based interventions delivered to the recipients. The studies only reported the average amount of time per session during which the participants had received rehabilitation services from occupational therapists, physical therapists, speech-language therapists and nurses. However, the type and intensity of treatment delivered by these professionals were not identified.

Control of bias was also inadequate as there are issues with blinding of participants (Benvenuti et al., 2014; Donnelly et al., 2004; Harrington et al., 2009; Jeong & Kim, 2007; Lincoln et al., 2004; Markle-Reid et al., 2011; Patterson, 2010; Rudd et al., 1997; Stuart et al., 2009; Wolfe et al., 2000). Many studies failed to use intention-to-treat analysis when needed (Benvenuti et al., 2014; Donnelly et al., 2004; Jeong & Kim, 2007; Lincoln et al., 2004; Markle-Reid et al., 2011; Patterson, 2010; Rudd et al., 1997; Stuart et al., 2009), and detect clinically important effect (Benvenuti et al., 2014; Donnelly et al., 2004; Harrington et al., 2009; Jeong & Kim, 2007; Lincoln et al., 2004; Markle-Reid et al., 2011; Patterson, 2010; Stuart et al., 2009; Wolfe et al., 2000).

The review of PEDro scores showed similar issues with allocation, blinding and outcomes assessment. Five studies received "good" rating in PEDro scale. Three out of 10 studies accounted for all participants in the follow-up assessment, with 2 studies using intention-to-treat statistical analysis and 1 study having no drop out. Meta-analysis was not performed due to insufficiency of studies that used similar outcome measures.

Outcomes related to Activities of Daily Living

Seven out of 10 studies reported six ADL outcome measures: Barthel Index (BI) and its modified version (mBI), Nottingham Extended Activities of Daily Living Scale (NEADL), Rivermead Mobility Index (RMI), Frenchay Activity Index (FAI), and Rivermead ADL scale. Either BI or RMI was used by 7 studies to measure improvement in BADLs, while NEADL or FAI was used by 3 studies to measure improvement in IADLs.

Of the 7 studies, only 1 study (Benvenuti et al., 2014) reported significantly better improvement in BADLs ($p = 0.0001$) and IADLs ($p < 0.002$) for the CBI group compared to usual care (visit to general practitioner and outpatient PT). The remaining 6 studies reported between-group comparisons that show no statistical difference for BADL or IADL outcomes (Donnelly et al., 2004; Harrington et al., 2009; Lincoln et al., 2004; Rudd et al., 1997; Stuart et al., 2009). Five out of 6 compared BADL outcomes, with one study showing higher mean value for CBI, another one favouring the control group, and the rest showing similar mean values for both groups. On the other hand, three out of 6 compared IADL outcomes: one study reported higher mean value for CBI, while the other two studies favoured the control group among the three studies that used outcome measures for IADL.

Within-group comparisons were not reported by five out of 7 studies (Benvenuti et al., 2014; Donnelly et al., 2004; Lincoln et al., 2004; Rudd et al., 1997; Wolfe et al., 2000). Two studies did not report baseline values for at least one ADL outcome measure (Rudd et al., 1997; Lincoln et al., 2004), and 4 studies did not report statistical significance of difference between pre- and post-test values of at least one ADL outcome measure (Benvenuti et al., 2014; Donnelly et al., 2004; Rudd et al., 1997; Wolfe et al., 2000). Nevertheless, all studies showed improvement of baseline mean values at follow-up for the ADL outcome measures of the CBI group. In the usual group, 1 study (Benvenuti et al., 2014) showed decreased performance for both BADLs and IADLs. The remaining 2 studies (Harrington et al., 2009; Stuart et al., 2009) reported statistically significant change between baseline and follow-up values. One study (Stuart et al., 2009) reported that there was significant improvement on BADLs for the CBI group only, while the other (Harrington et al., 2009) reported improvement on both BADLs (mobility) and IADLs for both the CBI and usual groups.

Outcomes related to Quality of Life

All 10 studies included QOL as an outcome of interest, using 8 different questionnaires, namely Stroke Impact Scale (SISv2 and SIS-16), EuroQol 5 Dimensions (EQ5D), Nottingham Health Profile (NHP), Quality of Life assessment (QOL), World Health Organisation Quality of Life -BREF (WHOQOL-BREF), Korean Stroke-Specific Quality of Life Scale (K-SSQOL), and Nottingham Health Profile (NHP). Among these 10 studies, 2 reported that CBI resulted in statistically significant better outcomes for selected areas of SISv2 (Benvenuti et al., 2014; Stuart et al., 2009) compared to usual care. Benvenuti et al. (2014) reported significant difference in QOL associated with ADLs, mobility, and manual dexterity favouring CBI, while Stuart et al. (2009) reported significantly better QOL outcomes for participation in the CBI group. The rest of the studies did not report between- group statistically significant QOL improvement.

Among the 8 studies that failed to reach statistically significant results, one study (Rudd et al., 1997) reported greater post-test values for the CBI group (CBINHP=14$\pm$9; Usual=12$\pm$8; p=0.11), while two studies (Lincoln et al., 2004; Wolfe et al., 2000) reported post-test values in favour of the control group (CBIEQ5D=52$\pm$27.41, Usual EQ5D=55$\pm$23.70, p=0.75; CBINHP=9.5$\pm$7; Usual NHP=12.5$\pm$6.5; p=0.16). Four studies reported CBI and control groups surpassing each other in different sections of the outcome measures (Donnelly et al., 2004; Harrington et al., 2009; Jeong & Kim, 2007; Markle-Reid et al., 2011). No comparison can be made for one study (Patterson, 2010) because the mean for each group was not provided.

Within group analysis was reported only in the studies of Harrington et al. (2009) and Stuart et al. (2009). In these studies, those that received CBI improved significantly in the Psychological section of the WHOQOL-BREF, and in the Communication and Participation sections of SISv2. Among the 6 studies that presented the mean values for the QOL measures in both groups, 3 studies (Benvenuti et al., 2014; Donnelly et al., 2004; Harrington et al., 2009; Jeong & Kim, 2007; Lincoln et al., 2004; Markle-Reid et al., 2011; Patterson, 2010; Rudd et al., 1997; Stuart et al., 2009; Wolfe et al., 2000) reported lack of positive change in score in at least one area of the QOL measure for CBI and 2 studies (Benvenuti et al., 2014; Markle-Reid et al., 2011) for the control group. In these studies, it was observed that there are more instances of decreased mean values for the control group than for CBI.

DISCUSSION

This systematic review revealed the current level of research about the effectiveness of community-based interventions in improving outcomes related to ADL performance and quality of life among people with stroke. The review showed the emerging trend demonstrating that CBI is at least as effective as usual care, and in some cases better, in improving both ADL performance and QOL. Even though most of the included studies failed to reach statistical significance for between-group comparison of post-test values, these studies were reporting better follow-up mean/mean change values for the CBI group, particularly in QOL (Benvenuti et al., 2014; Rudd et al., 1997; Stuart et al., 2009).

The absence of randomisation and blinding is an important confounding factor that affected generalisability of the study results (Armijo-Olivo et al., 2017; Kamper, 2018). However, it should be recognised that blinding and randomisation may be difficult to implement in community-based research. For example, blinding of treatment assignment is likely to be impossible in rehabilitation research where participants must be part of the decision-making throughout the research process (WHO & World Bank, 2011), and in trials wherein the settings in which the intervention is performed are visibly different between groups (Nichol, Bailey, & Cooper, 2010; WHO & World Bank, 2011). One of the studies included in this review even showed that political and ethical factors can preclude randomisation of participants in a community-based study (Stuart et al., 2009).

The included studies show that a wide range of CBIs focusing on health are used to improve ADL and QOL outcomes. This is an expected phenomenon, as numerous interventions can be designed as community-based to target multiple functional outcomes (Bowers et al., 2015; Graven et al., 2011; Iemmi et al., 2015; Markle-Reid et al., 2011). Approaches such as telerehabilitation, team rehabilitation, and exercise were discussed in some studies as potentially useful rehabilitation interventions for developing countries (Bettger et al., 2019; Yan et al., 2016). In addition, the focus of all interventions was clearly on the medical aspects of rehabilitation such as reduction of body impairments and activity training, in contrast to those that are more participation-oriented which involve changing of community perceptions and family relationships, or empowerment interventions which include the formation of self-help groups (Bowers et al., 2015). The focus of interventions on medical care was possibly because all the implementers are health professionals, who may have received stroke rehabilitation training limited to solving issues concerning the physical aspects of health and wellbeing. It is possible that QOL outcomes did not improve as much because of lack of

interventions that specifically targeted psychosocial factors such as depression, self-esteem issues, isolation, or economic issues. Despite this limitation, the type of intervention can influence health-related QOL outcomes, particularly in the physical and social participation domains. This can be inferred from 2 studies using different interventions (Benvenuti et al., 2014; Stuart et al., 2009) that resulted in significant QOL outcomes on dissimilar areas, in spite of having similar characteristics such as the outcome measures used, geographic location, age of participants, length of follow-up period, and the absence of randomisation and blinding.

The search strategy was unable to retrieve articles that described interventions focusing on other important areas that can improve ADL performance and QOL such as education, livelihood, and social wellbeing. One reason for this outcome is the current view about stroke rehabilitation being a health issue, so that most of the management was focused on health outcomes. This is similar to the concern raised by some interest groups about the medical nature of the term "rehabilitation" (De Groote, 2019). Additionally, the constructs "ADL" and "QOL" are closely associated and have historical ties with health and rehabilitation. Both of these concepts have been initially and widely used in the medical field (Costa Filho et al., 2018; Pennacchini, Bertolaso, Elvira, & De Marinis, 2011). While rehabilitation is undeniably an important strategy towards the improvement of ADL and QOL outcomes, IADLs and QOL have a close relationship with economic and social activities such as access to employment and support systems. This underscores the need for exploring the importance of focusing rehabilitation also on other components of the CBR Matrix, which are also linked with improved functional independence and quality of life (Mahesh et al., 2018; Wang & Langhammer, 2017; World Health Organisation & Swedish Organisations of Disabled Persons International Aid Association, 2002). Empowerment is another emerging area for research, focusing currently on health empowerment and not active social participation (Iemmi et al., 2015; Sit et al., 2016; WHO & SHIA, 2002). Another reason for the lack of returned articles may have been the limited databases used in this study which could have skewed the findings towards community-based interventions focusing on health, despite previous reviews already noting the focus of CBI on health needs of persons living with stroke (Bowers et al., 2015; Iemmi et al., 2015). The lack of freely accessible databases among LMICs is also an important contributor to insufficient infrastructures for accessing and even expanding research (WHO & World Bank, 2011), aside from the potential lack of data concerning CBI.

The current study obtained more articles specific to the research question than the previous reviews (Bowers et al., 2015; Iemmi et al., 2015). As expected, all the research articles included in the study came from high-income countries. The result exemplifies the persistent lack of high-quality community-based research output in low- and middle-income countries and any country with low resources noted in the previous years (Bowers et al., 2015; Iemmi et al., 2015).The limited number of returned articles vis-à-vis the presence of interventions that do not require intensive participation from health professionals (Harrington et al., 2009; Stuart et al., 2009) highlights the need for improving the research capacity of LMICs, and also presents an important reason for including HICs in CBI research within the context of community-based rehabilitation. This need can be further inferred based on the recent bibliometric analysis of research concerning stroke rehabilitation which shows that 75% of the published works from 2003-2013 were from HICs (Feng et al., 2013). Regardless of the country of origin, there is still an overall lack of research on the impact and parameters of specific CBIs, possibly denoting that both HICs and LMICs are not fully engaged in this field of research.

It is possible that the term "community-based intervention" has been inconsistently used up to the present, and this may have affected the search process as well. This is evidenced by how different authors from HICs and LMICs used this term, or used terms other than this, within their studies. "Community-based Rehabilitation" (CBR) was defined by the World Health Organisation (2010) as "a strategy within general community development for the rehabilitation, poverty reduction, equalisation of opportunities and social inclusion of all people with disabilities," coming from their joint position statement with the International Labour Office and United Nations Educational, Scientific and Cultural Organisation in 2004. CBR is focused on approaches that are developed in low-resource, capacity-constrained settings, especially LMICs (WHO, 2010). However, this term has been used throughout the literature to be synonymous with CBI within or outside the context of the CBR programme itself, whether it is developed within high-income countries (Bettger et al., 2019; Graven et al., 2011; Handberg, Mygind, & Johansen, 2019; Jackson, Troeung, & Martini, 2020; Jeong & Kim, 2007) or low- and middle- income countries (Iemmi et al., 2015; Yan et al., 2016).This makes searching for CBIs applicable to LMICs a tedious process.

Another example is the use of terms such as "domiciliary care" or "home-based treatment" which were noted during the search process (Olaleye, Hamzat, & Owolabi, 2013). These terms could have also referred to CBI within the context

of CBR, as the authors compared which interventions provide more accessible services. Though these articles were rejected due to difference in the outcomes of interest, future attempts to investigate CBI must consider these terms and any other terms that may also denote a similar construct. Indeed, there is a need to standardise the concept of CBR throughout the literature in order to consolidate evidence about the effectiveness of CBI particularly for persons living with stroke.

It is also worth mentioning that the heterogeneity of the selected ADL and QOL outcomes may have been influenced by the variety of interventions implemented for both CBI and usual care groups. This is particularly true in studies which used multidisciplinary services as a form of intervention for CBI, as most of these studies utilised individualised approaches which resulted in different types and intensity of interventions. To arrive at stronger conclusions however, these interventions and measures must be homogenised to allow meta-analysis of outcomes. The use of standardised rehabilitation procedures and measures and the accurate description of management must be consistently implemented in future studies to allow better estimation of outcomes (Bowers et al., 2015).

It is also possible that the selected studies reported better outcomes for usual care as the clients are already receiving high-quality traditional rehabilitation services. Those countries with better conventional rehabilitation services will report CBI as comparable to or less than the current ones. LMICs must look for alternative methods of delivering rehabilitative services such as CBI, because usual care in these places is more burdensome, costly, impractical, and/or inaccessible. Researchers from both HICs and LMICs must be cognisant that CBIs must at least be comparable to tested usual rehabilitation interventions in delivering outcomes to be considered effective.

This study reflects a major gap in CBI research on stroke rehabilitation and effectiveness of CBI on health-related outcomes. It is important for researchers and other stakeholders coming from high-income countries to partner with those in low- and middle-income countries in conducting research concerning effective and applicable CBI for stroke rehabilitation. Determination of cost-effective and accessible CBI for people with stroke is a shared issue that needs urgent response.

CONCLUSION

Community-based interventions have the potential to be effective strategies for improving the ADL and QOL outcomes of people with stroke. More studies

concerning CBIs involving different components of the CBR Matrix are needed to conclusively ascertain their effectiveness. There is also a need to standardise the terminologies to promote retrieval of evidence, and interventions and outcome measures to improve the strength of conclusions and applicability of the results of similar reviews in the future.

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