National Institute for Health and Care Excellence

Final

Stroke rehabilitation in adults (update)

[G] Evidence reviews for the clinical and cost-effectiveness of telerehabilitation for adults after a stroke

NICE guideline NG236

Evidence reviews underpinning recommendations 1.3.1 to 1.3.3 and recommendations for research in the NICE guideline

October 2023

Final

This evidence review was developed by NICE

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1. Telerehabilitation

1.1. Review question

In people after stroke, what is the clinical and cost effectiveness of telerehabilitation compared with standard rehabilitation and as an adjunct to standard rehabilitation?

1.1.1. Introduction

Telerehabilitation is the delivery of rehabilitation at a distance using electronic communication rather than 'in person'. Often helpful in more rural areas its use has increased by necessity during the covid pandemic and has enabled people to continue to receive rehabilitation. Telerehabilitation is delivered with an individual or a group and the types of technology used are varied.

1.1.2. Summary of the protocol

Table 1: PICO characteristics of review question

Population	Inclusion: • Adults (age ≥16 years) who have had a first or recurrent stroke Exclusion: • Children (age <16 years) • People who had a transient ischaemic attack
Interventions	• Telerehabilitation (the delivery of rehabilitation services via information and communication technologies. Clinically this includes rehabilitation services that include, intervention, supervision, education, consultation and counselling.) • Combination of telerehabilitation and in person rehabilitation
Comparisons	• In person rehabilitation only • Usual care
Outcomes	All outcomes are considered equally important for decision making and therefore have all been rated as critical: At the following time periods: • <6 months • ≥6 months If multiple outcomes are reported before or after these time periods then the latest time period that is ≤6 months or >6 months will be extracted and used in the analysis. • Person/participant generic health-related quality of life (continuous outcomes will be prioritised [validated measures]) • Carer generic health-related quality of life (continuous outcomes will be prioritised [validated measures]) • Activities of daily living (continuous outcomes will be prioritised) • Mobility (continuous outcomes will be prioritised) • Balance (continuous outcomes will be prioritised) • Psychological distress - Depression (continuous outcomes will be prioritised) • Physical function – upper limb (continuous outcomes will be prioritised) • Stroke-specific measures of cognition (continuous outcomes prioritised)

	○ Non-spatial attention and working memory ○ Spatial attention ○ Memory ○ Executive functions • Swallow function and ability (continuous outcomes will be prioritised) • Functional communication (continuous outcomes will be prioritised) • Stroke-specific Patient-Reported Outcome Measures (continuous outcomes will be prioritised) • Withdrawal due to adverse events (dichotomous outcomes)
Study design	• Systematic reviews of randomised controlled trials • Randomised controlled trials • Crossover studies (for people after chronic stroke only) If no randomised controlled trial data are available, non-randomised data will be considered. 1. Prospective and retrospective cohort studies 2. Case control studies (if no other evidence identified) Published NMAs and IPDs will be considered for inclusion.

For full details see the review protocol in Appendix A.

1.1.3. Methods and process

This evidence review was developed using the methods and process described in Developing NICE guidelines: the manual. Methods specific to this review question are described in the review protocol in Appendix A and the methods document.

Declarations of interest were recorded according to NICE's conflicts of interest policy.

1.1.4. Effectiveness evidence

1.1.4.1. Included studies

One Cochrane review[20] and thirty-two randomised control trial studies were included in the review[1-13, 15, 16, 18, 19, 21-25, 28, 30-36, 38, 39], these are summarised in section 1.1.5. Evidence from these studies is summarised in the clinical evidence summary in section 1.1.6. This incorporated the results from one Cochrane review[20]. There were differences in the protocol which meant that some studies included in the Cochrane review were not included in this review. These are highlighted in the excluded studies table in Appendix J.

Telerehabilitation is an alternate way of delivering rehabilitation services. It incorporates a range of different techniques involving information and communication technologies that can facilitate communication between the healthcare professional and the patient in a remote location.

A recent Cochrane review by Laver 2020[20] provided the basis for the above definition. The committee acknowledged when designing the protocol that this definition could include various interventions delivered by different members of the multidisciplinary team. Due to the lack of evidence available, the committee decided that these interventions should be combined together in the meta-analyses. However, they reflected on the effectiveness of individual interventions where possible when considering the evidence and making recommendations.

The following interventions were compared:

- Telerehabilitation compared to:
  - In-person rehabilitation: 10 studies[1, 7, 8, 10, 22, 24, 25, 30, 31, 36]
  - Usual care: 9 studies[4, 5, 9, 11, 28, 32, 33, 35, 38]
- Combined telerehabilitation compared to:
  - In-person rehabilitation: 5 studies[12, 19, 21, 23, 39]
  - Usual care: 8 studies[2, 3, 6, 13, 15, 16, 18, 34]

Comparator interventions differed between the studies. However, in person rehabilitation generally involved face to face therapy that was time matched to the telerehabilitation therapy. Usual care interventions varied and could involve minimal contact with health care professionals (for example: the patient booking their own GP appointments as needed or information and advice only). Alternatively, usual care could involve face to face therapy that was not time matched to the intervention group. Combined telerehabilitation involved telerehabilitation delivered alongside any form of in person therapy.

Evidence was available for all outcomes apart from carer generic health-related quality of life and swallow function and ability.

Intervention factors

Interventions were included if they involved the delivery of post stroke rehabilitation services via information and communication technologies and enabled a two-way communication channel between the therapist and the patient.

These services could involve intervention, supervision, education, consultation, and counselling. Interventions that provided assessment only or consultation services were excluded as these did not provide a rehabilitation intervention and fell outside of the scope of the review question. This was a difference to the Laver 2020 Cochrane review.

Interactive and communication technologies included the telephone, video conferencing, the internet and online apps or messaging services, virtual reality, and monitoring via sensors or wearable devices. There were a mixture of information and communication technologies

used however, the majority were delivered via teleconferencing with real time communication. Interventions were provided by one or more health disciplines, including physiotherapists, occupational therapists, speech and language therapists, cognitive therapists, psychologists, nurses and the multidisciplinary team.

The majority of studies included physiotherapy or occupational therapy interventions and were focused on rehabilitation for the upper limb (9 studies)[1, 4, 10, 13, 16, 30, 31, 34, 36], balance (4 studies)[6, 21, 22 4911, 23], core stability (2 studies)[32, 33] and functional independence or mobility (4 studies)[2, 9, 11, 15]. There were two studies which involved physiotherapy plus electromyography triggered neuromuscular stimulation, with the aim of improving limb function, mobility, and balance[7, 8]. Four studies focused on speech and language therapy interventions[12, 24 4931, 25, 28] and one study reported a speech and language therapy intervention combined with cognitive therapy[39]. Two studies focused on well-being and mood[19, 35] and three studies reported a mixed focus intervention involving a multi-disciplinary team[3,Wu 2020 #4938,Jonsdottir, 2021 #4875].

Population factors

The majority of participants in the included studies were living in the community and were mixed between subacute and chronic populations. One study[21] included an inpatient population but the intervention was set up to mimic telerehabilitation, with the telerehabilitation delivered in a separate room and no contact with the therapist. The severity of stroke reported on the NIHSS was not reported in the majority of studies (four studies reported a moderate severity population and one a mild population).

Inconsistency

The majority of outcomes included only one study. In the limited cases where meta analysis was possible, a significant number of analyses indicated statistical heterogeneity. This could not be resolved by subgroup or sensitivity analysis, with most outcomes containing an insufficient number of studies to allow valid conclusions on the analyses to be drawn. Therefore, these outcomes were downgraded for inconsistency.

See also the study selection flow chart in Appendix C, study evidence tables in Appendix D, forest plots in Appendix E and GRADE tables in Appendix F.

1.1.4.2. Excluded studies

See the excluded studies list in Appendix J.

1.1.5. Summary of studies included in the effectiveness evidence

Table 2: Summary of studies included in the evidence review that report telerehabilitation alone used as the intervention

Study	Intervention and comparison	Population	Outcomes	Comments
Allegue 2022[1]	**Telerehabilitation** (n=4) VirTele is an 8-week home rehabilitation program that includes Jintronix exergames for UE rehabilitation and the Reacts app to conduct videoconference sessions with clinicians. Rehabilitation was delivered 5 days per week (30-minute sessions), targeting 20 hours of exercise overall.	**People after a first or recurrent stroke** Mean age (SD): 57.1 (19.7) years N = 11 Severity: Not reported Mean time period since stroke:	Physical function – upper limb at <6 months Stroke-specific Patient-Reported Outcome Measures at <6 months	Setting: Community setting in Quebec, Canada. Sources of funding: This work was supported by the Canadian Institutes of Health Research (385297, 2017) [32,33], doctoral scholarships from the School of Rehabilitation of

Study	Intervention and comparison	Population	Outcomes	Comments
	Minutes/hours of intervention per day: ≤45 minutes Number of days of treatment per week: 5 days Mode of delivery: Videoconferencing Mode of feedback: real time communication **In person rehabilitation** (n=4) Control group received the GRASP, which included exercises for the arm and hand (strengthening and range of motion) and functional activities targeting the UE. The control group was invited to perform the GRASP exercises for 8 weeks, 5 days per week (30-minute sessions), targeting 20 hours of exercise overall (same as the experimental group) **Concomitant therapy:** No additional information	Chronic (>6 months) Focus of care: Upper limb		Université de Montréal, graduate and postdoctoral studies of Université de Montréal, the Center for Interdisciplinary Research in Rehabilitation of Greater Montreal, and Wilrose Desrosiers and Pauline Dunn Funding. The funding sources were not involved in the research or preparation of this paper
Bizovicar 2017 [4]	**Telerehabilitation** (n=5) Training focused on posture and exercises for the neck, shoulders, torso, and upper limbs. The participant was asked to do exercises daily 3 months after discharge from the rehabilitation setting. Therapists interviewed the participant and relatives once a week during which they checked adherence to exercises, answered questions, monitored progress, and adjusted the content of the exercise programme, as required. Minutes/hours of intervention per day: Unclear/not stated	**People after a first or recurrent stroke** Mean age: 67 years N = 10 Severity: Unclear/not stated Mean time period since stroke: Unclear/not stated Focus of care: Upper limb	Physical function – upper limb at <6 months	Setting: community based at home in Slovenia Sources of funding: No additional information.

Study	Intervention and comparison	Population	Outcomes	Comments
	Number of days of treatment per week: 7 days per week Mode of delivery: Videoconferencing Mode of feedback: real time communication **Usual care** (n=5) Were provided with oral and written instructions for similar exercises. The person was instructed to do the exercises of their choice and abilities 1 to 2 times per day. **Concomitant therapy:** No additional information			
Boter 2004[5]	**Telerehabilitation** (n=263) 3 nurses initiated telephone contacts (1 to 4; 4 to 8; and 18 to 24 weeks after discharge) and visits to participants in their homes (10 to 14 weeks after discharge). Nurses supported participants and caregivers according to their individual needs (e.g. by providing information or reassurance) or advised participants to contact their GP when further follow-up was required. Written educational material was provided and discussed. Nurses aimed to support participants and caregivers in solving problems themselves or coping with them rather than solving problems for them. Minutes/hours of intervention per day: Unclear/not stated Number of days of treatment per week: <5 days Mode of delivery: Telephone	**People after a first or recurrent stroke** Mean age (SD): 70.1 (11.6) years N = 536 Severity: Unclear/not stated Mean time period since stroke: Subacute (7 days – 6 months) Focus of care: Mood	Activities of daily living at ≥6 months Psychological distress – Depression at ≥6 months Withdrawal due to adverse events at ≥6 months	Setting: 12 hospitals in the Netherlands, Holland Sources of funding: This study was supported by an established clinical investigator grant from the Netherlands Heart Foundation to G.J.E.R. (grant D98.014), by a grant from the Netherlands Heart Foundation and the Netherlands Organization for Health Research and Development (940-32- 014), and by a grant from the University Medical Center Utrecht.

Study	Intervention and comparison	Population	Outcomes	Comments
	Mode of feedback: real time communication **Usual care** (n=273) Standard care: no details provided **Concomitant therapy:** No additional information			
Chen 2017[7]	**Telerehabilitation** (n=26) Individualised telerehabilitation physical exercise plan selected by treating therapists and provided as prescription within the telerehabilitation apparatus. Therapists supervised via live video and collected data remotely. Minutes/hours of intervention per day: 1-2 hours Number of days of treatment per week: 5 days per week Mode of delivery: Videoconferencing Mode of feedback: real time communication **In person rehabilitation** (n=26) Control intervention: received rehabilitation in the outpatient therapy department. Exercises and ETNS were the same but the therapy was provided face-to-face with therapists. **Concomitant therapy:** After discharge, participants in both groups were given physical exercises and electromyography-triggered neuromuscular stimulation (ETNS). Exercises were conducted for 1 hour, twice in a working day for 12 weeks (total = 60 sessions). ETNS was conducted by	**People after a first or recurrent stroke** Mean age (SD): 66.3 (12.2) years N = 54 Severity: Moderate (or NIHSS 5-14) Mean time period since stroke: Subacute (7 days – 6 months) Focus of care: Upper limb Lower limb	Activities of daily living at <6 and ≥6 months Balance at <6 and ≥6 months	Setting: Shanghai 5th People's Hospital Affiliated to Fudan University, Shanghai, China and home based. Sources of funding: This trial is funded by a project grant from Shanghai Strategic Emerging Industries Project Plan (number 2013SJXW152). The apparatus used in this study were developed and provided by Shanghai NCC Electronic Co. Ltd.

Study	Intervention and comparison	Population	Outcomes	Comments
	using a portable muscle electricity biofeedback instrument for 20 minutes, twice in a working day for 12 weeks, a total of 60 session.			
Chen 2020[8]	**Telerehabilitation** (n=26) Telerehabilitation physical exercise plan selected by treating therapists and provided as prescription within the telerehabilitation apparatus. Therapists supervised via live video and collected data remotely. Minutes/hours of intervention per day: 1-2 hours Number of days of treatment per week: 5 days per week Mode of delivery: Videoconferencing Mode of feedback: real time communication **In person rehabilitation** (n=26) Control intervention: received rehabilitation in the outpatient therapy department. Exercises and ETNS were the same but the therapy was provided face-to-face with therapists. **Concomitant therapy:** After discharge, participants in both groups were given physical exercises and electromyography-triggered neuromuscular stimulation (ETNS). Exercises were conducted for 1 hour, twice in a working day for 12 weeks (total = 60 sessions). ETNS was conducted by using a portable muscle electricity biofeedback instrument for 20 minutes, twice in a working day for	**People after a first or recurrent stroke** Mean age (SD): 61.8 (10.0) years N = 52 Severity: Moderate (or NIHSS 5-14) Mean time period since stroke: Subacute (7 days – 6 months) Focus of care: Upper limb Lower limb	Activities of daily living at <6 months Physical function – upper limb at <6 months Withdrawal due to adverse events at <6 months	Setting: Shanghai 5th People's Hospital Affiliated to Fudan University, Shanghai, China and home based. Sources of funding: This trial is funded by a project grant from Shanghai Stra tegic Emerging Industries Project Plan (number 2013SJXW152). The apparatus used in this study were developed and provided by Shanghai NCC Electronic Co. Ltd.

Study	Intervention and comparison	Population	Outcomes	Comments
	12 weeks, a total of 60 session.			
Chumble r 2012[9]	**Telerehabilitation** (n=25) Intervention included 3 tele-visits, use of an in-home messaging device and 5 telephone calls over a 3-month period. The tele-visits involved assessment of physical function, goal setting and demonstration of exercises; a research assistant used a camcorder to record the home environment and the participant completing tests of physical and functional performance that were later reviewed by the tele therapist. Minutes/hours of intervention per day: 1-2 hours Number of days of treatment per week: <5 days a week Mode of delivery: Telephone Mode of feedback: Store and forward **Usual care** (n=23) Participants randomized to the usual care group were not contacted by study personnel other than for the initial recruitment and consent, and to obtain baseline and outcome measures. The usual care participants could receive any services provided as part of their usual VA or non-VA care, such as home health care. **Concomitant therapy:** No additional information	**People after a first or recurrent stroke** Mean age (SD): 67.4 (9.7) years N = 48 Severity: Moderate (or NIHSS 5-14) Mean time period since stroke: Subacute (7 days – 6 months) Focus of care: Functional independency	Physical function – upper limb at <6 and ≥6 months	Setting: Recruited from 3 Veterans Affairs Medical Centres in the United States of America Sources of funding: This award was funded by the Eunice Kennedy Shriver National Institute of Child Health and Human Development as well as grants U01 NS091951, K24 HD074722, and T32 AR047752 from the NINDS.
Cramer 2019[10]	**Telerehabilitation** (n=62) System software supported videoconferencing and organized the 70 minutes of therapy, which	**People after a first or recurrent stroke** Mean age (SD): 62 (14) years N = 124	Physical function – upper limb at <6 months	Setting: 11 sites in rehabilitation units and home based in the United States of America

Study	Intervention and comparison	Population	Outcomes	Comments
	consisted of exercises, functional games, and stroke education as described in "For Both Groups." Supervised sessions began with a 30-minute patient-therapist videoconference, during which therapists supervised therapy, answered questions, reviewed treatment plans, and performed study assessments. Unsupervised sessions had the same treatment content as supervised sessions but without therapist contact. Minutes/hours of intervention per day: ≤45 minutes Number of days of treatment per week: 6 days per week Mode of delivery: Videoconferencing Mode of feedback: real time communication **In person rehabilitation** (n=62) The 18 supervised treatment sessions took place at the research center, during which treatment therapists provided 70 minutes of continuous supervision. The 18 unsupervised treatment sessions were at home, guided by an individualized booklet created and printed by treatment therapists and containing diagrams and instructions for functional tasks plus exercises from the same list available during supervised days. **Concomitant therapy:** No additional information	Severity: Mild (or NIHSS 1-5) Mean time period since stroke: Subacute (7 days – 6 months) Focus of care: Upper limb		Sources of funding: This trial is funded by a project grant from Shanghai Stra tegic Emerging Industries Project Plan (number 2013SJXW152). The apparatus used in this study were developed and provided by Shanghai NCC Electronic Co. Ltd.
Dawson 2022[11]	**Telerehabilitation** (n=8) Tele-CO-OP service allow for goal setting and	**People after a first or recurrent stroke**	Activities of daily living at <6 months	Setting: Community-based in Canada

Study	Intervention and comparison	Population	Outcomes	Comments
	problem solving delivered via Skype. Minutes/hours of intervention per day: Not stated/unclear Number of days of treatment per week: Not stated/unclear Mode of delivery: Videoconferencing Mode of feedback: real time communication **Usual care** (n=9) Treatment as usual. **Concomitant therapy:** Typically no active rehabilitation.	Mean age (SD): 59.3 (12.6) years N = 17 Severity: Not stated/unclear Mean time period since stroke (SD): 8.8 (8.8) years Focus of care: Functional independency	Psychological distress – depression at <6 months	Sources of funding: Support from a grant from the Heart & Stroke Foundation.
Lin 2014[22]	**Telerehabilitation** (n=12) Tele-balance training focused on 10 minutes of standing exercise according to 3D animation exercise videos and about 10 minutes of 3D interactive games with finger touching the touch screen in standing posture. 1 therapist conducted the telerehabilitation balance training at the therapist end to each facility for 1 month, separately. 1 volunteer or non-medical person was assigned at the patient end for safety and assistance in telerehabilitation and conventional training. Minutes/hours of intervention per day: >45 minutes to 1 hour Number of days of treatment per week: <5 days per week Mode of delivery: Videoconferencing Mode of feedback: real time communication **In person rehabilitation** (n=12)	**People after a first or recurrent stroke** Mean age (SD): 75.1 (3.0) years N = 24 Severity: Not stated/unclear Mean time period since stroke: Chronic (>6 months) Focus of care: Lower limb Functional independency	Activities of daily living at <6 months Balance at <6 months	Setting: Three different long term care facilities (two rural facilities in Taipei, Taiwan and one rural facility in Taichung, Taiwan). Sources of funding: This project was reviewed and funded by the Ministry of Science and Technology, Taiwan (Grant No. 99- 2218-E-002-004).

Study	Intervention and comparison	Population	Outcomes	Comments
	Two post-stroke participants attended the same session as the small therapy group. The therapist conducted conventional balance training programs following simple to complex principle. However, the small ball and peg bars are used for hand manipulation during sitting and standing balance training. **Concomitant therapy:** No additional information			
Maresca 2019[24]	**Telerehabilitation** (n=15) Two phases. In phase one: experimental linguistic therapy performed using a virtual reality rehabilitation system. In phase 2, they were provided with a touchscreen virtual reality rehabilitation system-tablet. Twice a week the neuropsychologist performed a videoconference to monitor the rehabilitation process and discuss performance of the exercises. The tablet contains about 30 different exercises with over 1000 customisable and editable levels, divided into cognitive and linguistic modules, which includes exercises on attention, memory, perception, executive functions and speech/language abilities. The study lasted 6 months and included the two phases which lasted 12 weeks each. Training was completed 5 days a week with each session lasting about 50 minutes. Minutes/hours of intervention per day: >45 minutes to 1 hour	**People after a first or recurrent stroke** Mean age (SD): 51.3 (11.6) years N = 30 Severity: Unclear/not stated Mean time period since stroke: Unclear/not stated Focus of care: Communication	Person/participant generic health-related quality of life at ≤6 months Psychological distress – Depression at <6 months	Setting: Inpatient initially moving to outpatient in Italy. Sources of funding: No additional information.

Study	Intervention and comparison	Population	Outcomes	Comments
	Number of days of treatment per week: 5 days per week Mode of delivery: Videoconferencing Mode of feedback: real time communication **In person rehabilitation** (n=15) Traditional linguistic treatment with the same exercises as the experimental linguistic therapy. The study lasted 6 months and included the two phases which lasted 12 weeks each. Training was completed 5 days a week with each session lasting about 50 minutes. **Concomitant therapy:** No additional information			
Meltzer 2018[25]	**Telerehabilitation** (n=22) Weekly 1 hour sessions with the therapist over 10 weeks received in telerehabilitation conditions. People had an initial 2-hour in person meeting with the therapy team which included initial assessments, goal identification and instruction on using the TalkPath software. Remote therapy sessions conducted using teleconferencing equipment and software. Three therapy sessions (weeks 3, 6 and 9) had 30 minutes devoted exclusively to the communication partner, giving training on Supported Conversation techniques and helping the partner keep the client on track with the treatment program. Homework exercises were provided.	**People after a first or recurrent stroke** Mean age (SD): 64.2 (11.1) years N = 44 Severity: Unclear/not stated Mean time period since stroke: Chronic (>6 months) Focus of care: Communication	Stroke-specific measures of cognition (non-spatial attention and working memory) at <6 months Stroke-specific measures of cognition (memory) at <6 months Stroke-specific measures of cognition (executive functions) at <6 months	Setting: Outpatient setting in Canada Sources of funding: The project was supported by a "Telerehabilitation for Stroke" grant from the Heart and Stroke Foundation Canadian Partnership for Stroke Recovery. Matching funds were generously provided by the Manitoba Patient Access Network (MPAN).

Study	Intervention and comparison	Population	Outcomes	Comments
	Minutes/hours of intervention per day: 1-2 hours Number of days of treatment per week: <5 days per week Mode of delivery: Videoconferencing Mode of feedback: real time communication **In person rehabilitation** (n=22) Same therapy principles but delivered in person. **Concomitant therapy:** No additional information			
Ora 2020[28]	**Telerehabilitation** (n=32) A speech and language therapy telerehabilitation intervention of five hours a week in line with current Norwegian national guidelines was chosen. The therapy was delivered via videoconference over four consecutive weeks. Participants were required to complete ≥16 sessions of speech-language therapy via videoconference over 32 days. Minutes/hours of intervention per day: 1-2 hours Number of days of treatment per week: 5 days per week Mode of delivery: Videoconferencing Mode of feedback: real time communication **Usual care** (n=30) Participants who were allocated to the control group did not receive any project specific intervention. The dosage of usual care measured by hours from inclusion to follow-up assessment was	**People after a first or recurrent stroke** Mean age (SD): 64.9 (12.0) years N = 62 Severity: Unclear/not stated Mean time period since stroke: Subacute (7 days – 6 months) Focus of care: Communication	Functional communication at <6 months Withdrawal due to adverse events at <6 months	Setting: Oslo region from stroke units at four different hospitals, from rehabilitation institutions including Sunnaas Rehabilitation Hospital. Community based therapy completed most commonly at home in Norway. Sources of funding: The trial is funded by the South-Eastern Norway Regional Health Authority (project number 2015037) and has also received financial support from the University of Oslo and Sunnaas Rehabilitation Hospital. The NMAHP RU and MB is supported by the Chief Scientist Office, part of the Scottish Government Health and Social Care Directorates.

Study	Intervention and comparison	Population	Outcomes	Comments
	recorded in a log-form. The log was piloted in cooperation with the participant's family/caregivers. Information on dosage was also retrieved from the speech-language pathologists providing the usual care and through participants' journal during and/or after completion of the trial. **Concomitant therapy:** All trial participants received usual care during the study period provided by local speech language pathologists at the community level and/or in a rehabilitation institution.			
Piron 2009[30]	**Telerehabilitation** (n=18) Virtual reality telerehabilitation programme used 1 computer workstation at the participant's home and 1 at the rehabilitation hospital. The system used a 3D motion tracking system to record arm movements through a magnetic receiver into a virtual image. The participant moved a real object by following the trajectory of a virtual object displayed on the screen in accordance with the requested virtual task. 5 virtual tasks comprising simple arm movements were devised for training. Minutes/hours of intervention per day: 1-2 hours Number of days of treatment per week: 5 days per week Mode of delivery: Videoconferencing Mode of feedback: real time communication **In person rehabilitation**	**People after a first or recurrent stroke** Mean age (SD): 65.2 (7.9) years N = 36 Severity: Unclear/not stated Mean time period since stroke: Chronic (>6 months) Focus of care: Upper limb	Physical function – upper limb at <6 months	Setting: Rehabilitation hospital and home based in Italy. Sources of funding: No additional information.

Study	Intervention and comparison	Population	Outcomes	Comments
	(n=18) Specific exercises for the upper limb with progressive complexity. Started with control of isolated movements without postural control, then postural control including touching different targets and manipulating objects. Sessions were 60 minutes, 5 times per week for 4 weeks (20 hours total). **Concomitant therapy:** No additional information			
Piron 2008[31]	**Telerehabilitation** (n=5) The purpose of the intervention was to improve upper limb function using a virtual reality programme. Patient-therapist interaction facilitated by a videoconferencing unit beside the telerehabilitation equipment. 1 computer was at the hospital and 1 at the participant's home. Minutes/hours of intervention per day: 1-2 hours Number of days of treatment per week: 7 days per week Mode of delivery: Videoconferencing Mode of feedback: real time communication **In person rehabilitation** (n=5) Virtual reality workstation with a 3D motion tracking system that recorded the participant's arm movements. The participant's movement was represented in the virtual environment. The therapist created a sequence of virtual tasks for the participant to complete with the affected	**People after a first or recurrent stroke** Mean age (SD): 59 (14.5) years N = 16 Severity: Unclear/not stated Mean time period since stroke: Chronic (>6 months) Focus of care: Upper limb	Physical function – upper limb at <6 months	Setting: Rehabilitation hospital and home based in Italy. Sources of funding: The project was supported by the Veneto Region, Italy.

Study	Intervention and comparison	Population	Outcomes	Comments
	arm. Participants could see their own trajectory and the ideal/desired trajectory. **Concomitant therapy:** No additional information			
Salgueiro 2022[33]	**Telerehabilitation** (n=20) People had individual access to the "Farmalarm" App as a telerehabilitation tool to guide home-based core stability exercises. Users can voluntarily access exercise guides on demand and confirm and evaluate their performance. All exercises were produced by an experienced neurologic physiotherapist who were available for video calls using the App. The principle researcher had access to the administrator panel of the app for individual monitoring of each user and contacted them by phone call to encourage the use of the application and to clarify any possible doubts. Minutes/hours of intervention per day: Unclear/not stated Number of days of treatment per week: Unclear/not stated Mode of delivery: Telephone Mode of feedback: real time communication **Usual care** (n=29) Usual care (no additional information) **Concomitant therapy:** Usual care was available to all (no additional information).	**People after a first or recurrent stroke** Mean age (SD): 71.0 (12.8) years N = 49 Severity: Unclear/not stated Mean time period since stroke: Unclear/not stated Focus of care: Lower limb Functional independency	Mobility at <6 months Balance at <6 months Withdrawal due to adverse events at <6 months	This study is reported in the forest plots as Salgueiro 2022A. Setting: People from 4 hospitals in Catalonia, Spain. People received telerehabilitation care after discharge from hospital and return to home. Sources of funding: INMovens Solutions S.L., the Hospital Vall d'Hebron (Barcelona) research team and the Institut de Recerca de l'Hospital de la Santa Creu i Sant Pau research team provided technical support and expenses related to it (Marato TV3 Telethon grant: 201737-10).

Study	Intervention and comparison	Population	Outcomes	Comments
Salgueiro 2022[32]	**Telerehabilitation** (n=15) Participants had individual access to the Farmalarm App as a telerehabilitation tool to guide adapted home-based core stability exercise. Participants were asked to perform 10 repetitions of each of the 32 exercises proposed in the program and were encouraged to perform as many exercises as possible, respecting their perception of tiredness. The exercises were introduced in order of difficulty, from the supine position to a seated position on an unstable base. The programme was carried out at home with the help of the App for 12 weeks, 5 days a week. The participants were contacted by phone on a regular basis to ensure that they did not have problems with the use of the App. Minutes/hours of intervention per day: Unclear/not stated Number of days of treatment per week: 5 days per week Mode of delivery: Telephone Mode of feedback: real time communication **Usual care** (n=15) Consisted of face-to-face sessions of therapeutic techniques. Participants maintained their usual dose of treatment during participation in this study. In accordance with clinical recommendations the mean frequency of the sessions was 1 h two times a week for 12 weeks. The physiotherapy sessions were face-to-face and individualized.	**People after a first or recurrent stroke** Mean age (SD): 60.9 (7.9) years N =30 Severity: Unclear/not stated Mean time period since stroke: Chronic (>6 months) Focus of care: Core stability	Mobility at <6 months Balance at <6 months	This study is reported in the forest plots as Salgueiro 2022B. Setting: Neurorehabilitation Clinic in Barcelona, then home based in Spain. Sources of funding: This research was partial funded by Fundació Marató de TV3, grant number 201737-83.

Study	Intervention and comparison	Population	Outcomes	Comments
	Concomitant therapy: Both groups underwent the conventional physiotherapy described above.			
Smith 2012[35]	**Telerehabilitation** (n=19) Consisted of 5 components designed to support the caregiver and provide caregiver with knowledge, resources and skills to assist him or her in reducing 'personal distress' and providing optimal emotional care to the stroke survivor. Intervention took place over 11 weeks. Two online chat sessions weekly were led by the PG for a total of 17 sessions. Chats were held using Adobe Connect in groups of 4–5 CGs each. Minutes/hours of intervention per day: Unclear/not stated Number of days of treatment per week: <5 days per week Mode of delivery: None of these options. Web chat only Mode of feedback: real time communication **Usual care** (n=19) The control group received an online video in which the same Professional Guide explained the features of the Resource Room and encouraged CGs to use it as a caregiving resource. A weekly caregiving tip was also presented online, and a toll free phone number was provided in case CGs encountered technological problems while accessing the Resource Room, or if a medical emergency occurred.	**People after a first or recurrent stroke** Mean age (SD): 59.5 (11.2) years N = 38 Severity: Unclear/not stated Mean time period since stroke: Unclear/not stated Focus of care: Mood	Psychological distress – Depression at <6 months	Setting: Community setting in the United States of America. Sources of funding: This research was funded by grant number R21NR010189-02 to Drs. Gregory C. Smith (PI); Nichole Egbert (CoPI; and Mary Dellman-Jenkins (Co-PI)

Study	Intervention and comparison	Population	Outcomes	Comments
	Concomitant therapy: No additional information			
Uswatte 2021[36]	**Telerehabilitation** (n=12) A typical training session was similar to that for participants in the CIMT control group except that training was done at home with Tele-AutoCITE and supervision was remote. The trainer made a phone call to the participant 30 minutes ahead of time to alert the participant to the upcoming session. The trainer selected the training tasks based on the individual needs of the participant and set the shaping parameters (e.g., distance to target) based on the participant's training records from previous sessions. The trainer continuously monitored the progress of the participant using the audio-visual and data-stream feeds. Minutes/hours of intervention per day: 2-4 hours Number of days of treatment per week: 7 days per week Mode of delivery: Videoconferencing Mode of feedback: real time communication **In person rehabilitation** (n=12) Participants in the in-lab CIMT group received treatment face-to-face on an outpatient basis in our clinical research facility. In this group, training tasks were selected from a bank of 120 assembled by our laboratory based on the individual needs of a participant. Examples of tasks are lifting a stacking cones, spooning beans	**People after a first or recurrent stroke** Mean age (range): 59.6 (48.1 to 72.8) years N = 24 Severity: Unclear/not stated Mean time period since stroke: Chronic (>6 months) Focus of care: Upper limb	Physical function - upper limb at <6 and ≥6 months Withdrawal due to adverse events at <6 and ≥6 months	Setting: Community setting in the United States of America. Sources of funding: Supported by the National Institute of Child Health and Human Development of the National Institutes of Health, Bethesda, MD under award number R01HD053750.

Study	Intervention and comparison	Population	Outcomes	Comments
	from a bowl to a plate, and picking up coins. **Concomitant therapy:** Participants in both groups received 3.5 hours of treatment per day for 10 consecutive weekdays with one-on-one supervision from a trainer for the entirety of each treatment session. Three hours of each treatment session were committed to motor training following shaping principles; 30 minutes were committed to a package of procedures designed to promote changes in motor behaviour outside the treatment setting. Participants in both groups were asked to place a physical restraint on the less-affected arm to discourage use of that arm both in and outside of the treatment sessions for a target of 90% of waking hours over the two-week treatment period.			
Wu 2020[38]	**Telerehabilitation** (n=32) Home remote rehabilitation based on a collaborative care model. The home remote rehabilitation guidance uses a video conferencing system. The rehabilitation nurse performed a personalised remote rehabilitation instruction twice a week. Acutely the intervention includes health education, good limb positioning, breathing training, joint activity maintenance training, bed turning, early balance, early walking and discharge guidance with an average of 2 sessions per day delivered in groups remotely. In the recovery period training included sitting-up training, balance training, antispasmodic training,	**People after a first or recurrent stroke** Mean age (SD): 57.9 (10.4) years N = 64 Severity: Moderate (or NIHSS 5-14) Mean time period since stroke: Unclear/not stated Focus of care: Mixed (including multidisciplinary packages of care)	Activities of daily living at <6 months Mobility at <6 months Balance at <6 months Physical function – upper limb at <6 months Stroke-specific Patient-Reported Outcome Measures at <6 months	Setting: Initially hospital based. Home based for the telerehabilitation group in China Sources of funding: The study was funded by Changzhou Health Committee (guided project WZ201906).

Study	Intervention and comparison	Population	Outcomes	Comments
	intensive training of active activity ability of limbs, walking function training and activity training of daily life. Minutes/hours of intervention per day: Unclear/not stated At least 32 minutes, but otherwise not particularly clear Number of days of treatment per week: 5 days per week Mode of delivery: Videoconferencing Mode of feedback: real time communication **Usual care** (n=32) During hospitalisation people received routine early rehabilitation guidance and routine nursing measures. The main contents were the normal limb position, bed position transfer and joint activity maintenance training. After discharge people in the control group received only routine rehabilitation and nursing measures, including dietary guidance, which were conducted by telephone follow-up once a week. People can go to the rehabilitation clinic to get rehabilitation instructions as needed. **Concomitant therapy:** No additional information			

Table 3: Summary of studies included in the evidence review that report a combination of telerehabilitation and in person rehabilitation used as the intervention

Study	Intervention and comparison	Population	Outcomes	Comments
Asano 2021[2]	**Combination of telerehabilitation and in person rehabilitation** (n=61) A telerehabilitation system and standardised rehabilitation programme for three months. The standardized programme comprised both physiotherapy and occupational therapy components. A therapist determined the difficulty level and minimum range of motion desired for each exercise for each patient based on individual need. In addition, for ethical reasons, participants in the telerehab group were free to participate in centre-based (conventional or outpatient) rehabilitation if they desired. Minutes/hours of intervention per day: Unclear/not stated Number of days of treatment per week: 5 days Mode of delivery: Videoconferencing Mode of feedback: real time communication **Usual care** (n=63) Stroke patients in Singapore who are fully independent in performing activities of daily living (ADLs) normally do not receive any post-stroke rehabilitation. Those who are mild to moderately dependent in performing ADLs are commonly referred for centre-based (conventional or outpatient) rehabilitation	**People after a first or recurrent stroke** Age range: 40.5 to 89.6 years N = 124 Severity: Unclear/not stated Mean time period since stroke: Subacute (7 days - 6 months) Focus of care: upper limb and lower limb	Person/participant generic health-related quality of life at <6 months Activities of daily living at <6 months Mobility at <6 months Balance at <6 months	Setting: 2 stroke rehabilitation hospitals and community based in Singapore. Sources of funding: This trial was supported by a National University of Singapore Cross-Faculty Grant, a Singapore Millennium Foundation Grant and the Singapore Ministry of Health's National Medical Research Council under the Centre Grant Programme – Singapore Population Health Improvement Centre (NMRC/CG/C026/2017_NUHS).

Study	**Intervention and comparison**	**Population**	Outcomes	Comments
	after discharge from the acute hospital. Depending on need, patients receive a one-hour centre-based rehabilitation session approximately once or twice a week. This was considered as usual rehabilitation care for this trial. **Concomitant therapy:** No additional information			
Bishop 2014[3]	**Combination of telerehabilitation and in person rehabilitation** (n=23) Telephone contacts with both survivors and caregivers after discharge. The primary goal is to assist them in identifying problems during the transition back home. Telephone contacts took place over 6 months after discharge with the intervention formally beginning after the person arrived home. Contacts occurred weekly for 6 weeks, biweekly for the next 2 months, and then monthly for 2 months, for a total of 13 calls to each individual (26 calls per dyad). Minutes/hours of intervention per day: ≤45 minutes Number of days of treatment per week: <5 days per week Mode of delivery: Telephone Mode of feedback: real time communication **Usual care** (n=26) Standard medical follow-up only **Concomitant therapy:** Standard medical follow-up was available to all	**People after a first or recurrent stroke** Mean age (SD): 70.1 (11.6) years N = 49 Severity: Unclear/not stated Mean time period since stroke: Subacute (7 days - 6 months) Focus of care: Mixed (including multidisciplinary packages of care)	Activities of daily living at <6 and ≥6 months Psychological distress - Depression at <6 and ≥6 months	Setting: Community based at home in the United States of America. Sources of funding: National Institute for Mental Health NIMH grant 1 R21 MH54182-01 (April 1, 1994 to March 31, 1998)

Study	**Intervention and comparison**	**Population**	Outcomes	Comments
Burgos 2020[6]	**Combination of telerehabilitation and in person rehabilitation** (n=6) The telerehabilitation group received 9 sessions of 30 min per week for 4 weeks. In each session, participants trained in balance tasks using smartphone-based exergames controlled by body motions. Sensors were positioned using velcro fasteners at the lumbar level (posterior middle line) and at the anterior thigh of the paretic side. The therapist remotely monitored home progress using the web platform. The participant exercised at home using the proposed system while games scores and IMU recordings were sent to the platform database for monitoring. Minutes/hours of intervention per day: 1-2 hours Number of days of treatment per week: 6 days per week Mode of delivery: Videoconferencing Mode of feedback: real time communication **Usual care** (n=4) The control group received their standard rehabilitation treatment at the hospital site, (3 sessions of 40 min per week of physical therapy for 4 weeks). **Concomitant therapy:** Groups received their standard rehabilitation treatment at the hospital site (3 sessions of 40 min per week of physical therapy for 4 weeks).	**People after a first or recurrent stroke** Mean age (SD): 70.1 (11.6) years N = 10 Severity: Unclear/not stated Mean time period since stroke: Subacute (7 days – 6 months) Focus of care: Functional independency and Balance	Activities of daily living at <6 months Balance at <6 months	Setting: All patients were undergoing physical therapy in Santiago, Chile. Home based rehabilitation afterwards. Sources of funding: This research was partially funded by CIMT/HCUCH-Telemedicine Project of Universidad de Chile. The authors acknowledge partial financial support from the National Agency for Research and Development (ANID) projects.

Study	Intervention and comparison	Population	Outcomes	Comments
De Luca 2018[12]	**Combination of telerehabilitation and in person rehabilitation** (n=20) Computer-based Erica training, consisting of 24 sessions of 45 minutes each, 3 times a week for 8 weeks, whereas the control performed only CR (24 sessions, 3 times a week for 8 weeks). A trained cognitive therapist provided exercises with a growing hierarchy of complexity through the Erica rehabilitative platform. Minutes/hours of intervention per day: ≤45 minutes Number of days of treatment per week: 5 days per week Mode of delivery: Store and forward Mode of feedback: real time communication **In person rehabilitation** (n=15) Control rehabilitation consisted in a face-to-face approach between the patient and the therapist that was administered in individual sessions. Training was customized for the needs of each patient. Indeed, tasks were presented using a paper and-pencil modality, and these were specifically built to stimulate specific cognitive skill. **Concomitant therapy:** All the study participants underwent the same traditional therapy, 6 times a week for 8 weeks (i.e., 48 sessions of 45 minutes each). To summarize, the 2 groups were submitted to the same amount of	**People after a first or recurrent stroke** Mean age (SD): 43.1 (17.1) years N = 35 Severity: Unclear/not stated Mean time period since stroke: Subacute (7 days – 6 months) Focus of care: communication	Psychological distress – depression at <6 months Stroke-specific measures of cognition (non-spatial attention and working memory) at <6 months	Setting: Laboratory of Robotic and Cognitive Rehabilitation of Istituto di Ricerca e Cura a Carattere Scientifico Neurolesi in Messina in Italy. Sources of funding: No additional information.

Study	**Intervention and comparison**	**Population**	Outcomes	Comments
	neurorehabilitation, but only the EG performed computerized cognitive rehabilitation.			
Gauthier 2022[13]	**Combination of telerehabilitation and in person rehabilitation** (n=45) This group received 4 visits (5 h) over 3 weeks of in-clinic one-on-one treatment with a therapist. Therapy visits had an almost exclusive emphasis on behavioural intervention. To further develop capacity to perform specific tasks related to their treatment goals, participants independently practiced goal-directed tasks for 30 min on 10 separate days between therapy visits. The Tele-Gaming group received 6 additional brief behavioural video-consultations, totalling 26 h, between clinic visits. Video-consultations focused primarily on problem-solving around barriers to using the paretic arm during daily life. Minutes/hours of intervention per day: 1-2 hours Number of days of treatment per week: 7 days per week Mode of delivery: Videoconferencing Mode of feedback: real time communication **Usual care** (n=38) Traditional therapy involved the same frequency and duration of in clinic treatment as the gaming group (5 h, 4 visits), with a traditional focus on motor training. A self-managed home program consisted of 15	**People after a first or recurrent stroke** Mean age (SD): 59 (16) years N = 83 Severity: Unclear/not stated Mean time period since stroke: Chronic (>6 months) Focus of care: Upper limb Mixed (including multidisciplinary packages of care)	Physical function – upper limb at <6 and ≥6 months	Setting: Community based and outpatient community rehabilitation centres in the United States of America. Sources of funding: The Patient-Centered Outcomes Research Institute (PCORI, AD-1409 −20772), financially supported this research. Additional support for participant recruitment and regulatory affairs was provided by the Center for Clinical and Translational Sciences (National Center for Advancing Translational Sciences, Grant #8UL1TR000090−05).

Study	**Intervention and comparison**	**Population**	Outcomes	Comments
	min of strengthening exercises twice daily on the first 10 non-treatment days, to mirror the intensity and type of home practice that is routinely prescribed in standard clinical practice. **Concomitant therapy:** No additional information			
Grau-Pellicer 2020[15]	**Combination of telerehabilitation and in person rehabilitation** (n=24) App-delivered 8 week intervention of two alternate days a week in sessions of 1 hour (16 sessions in total) in groups of 4-6 participants with a physical therapist. A digital platform based on two mHealth apps, used to: 1) to supervise adherence to physical activity using the GPS and accelerometer, 2) to assess mood, effort, recovery, wellness and fatigue questionnaires, 3) to have bidirectional feedback: people could visualise results and exchange messages with the researchers; a pedometer; a WhatsApp group to give motivation for active lifestyle, feedback to participants and create a collective identity in the rehabilitation group; and participation in an exercise program. Minutes/hours of intervention per day: >45 minutes to 1 hour Number of days of treatment per week: <5 days per week Mode of delivery: telephone Mode of feedback: real time communication and store and forward	**People after a first or recurrent stroke** Mean age (SD): 65.27 (12.05) years N = 41 Severity: Unclear/not stated Mean time period since stroke: Chronic (>6 months) Focus of care: Functional independency	Person/participant generic health-related quality of life at <6 months Activities of daily living at <6 months Mobility at <6 months	Setting: Community based in Spain. Sources of funding: This study was funded by the 2018 PERIS grant (Strategic Plan of health research and innovation) by the Departament de Salut of the Catalan Government-Generalitat de Catalunya (SLT006/17/334). It was supported, in part, by DEP2015-68538 grant from Spain Government. MGP has received Fellowships from the Catalan Department of Health.

Study	**Intervention and comparison**	**Population**	Outcomes	Comments
	Usual care (n=17) Daily conventional rehabilitation program for 3 months that included: trunk exercises, muscle strengthening, occupational therapy and gait training. **Concomitant therapy:** No additional information.			
Huijgen 2008[16]	**Combination of telerehabilitation and in person rehabilitation** (n=11) The intervention with the HCAD system at home consisted of one month, whereby the patients had to perform at least one training session a day for five days a week with an average duration of 30 minutes. The HCAD system comprised a hospital-based server and the portable unit. With this portable unit a set of upper limb exercises and movements for correct functional activity of the upper limb were performed. **Usual care** (n=5) Control group received the GRASP, which included exercises for the arm and hand (strengthening and range of motion) and functional activities targeting the UE. The control group was invited to perform the GRASP exercises for 8 weeks, 5 days per week (30-minute sessions), targeting 20 hours of exercise overall (same as the experimental group) **Concomitant therapy:** No additional information	**People after a first or recurrent stroke** Mean age (SD): 70 (8) N = 16 Severity: Unclear/not stated Mean time period since stroke: Chronic (>6 months) Minutes/hours of intervention per day: 1-2 hours Number of days of treatment per week: 5 days per week Focus of care: Upper limb Mode of delivery: Videoconferencing Mode of feedback: real time communication	Physical function – upper limb at <6 months	Setting: Rehabilitation hospital and home based in the Netherlands. Sources of funding: No additional information
Jonsdottir 2021[18]	**Combination of telerehabilitation and in person rehabilitation** (n=11)	**People after a first or recurrent stroke**	Mobility at <6 months Balance at <6 months	Setting: Outpatients from 3 Italian clinical Centers.

Study	**Intervention and comparison**	**Population**	Outcomes	Comments
	Training carried out in the home of the participant without supervision. Training was programmed to be carried out five times per week for ~45 min, and once per week the trained physical therapists and psychologists modified the program for the following week according to participants abilities. The participants were invited to call the health personnel in case of difficulties with the setup or questions regarding the carrying out of exercises. Minutes/hours of intervention per day: >45 minutes to 1 hour Number of days of treatment per week: 5 days per week Mode of delivery: Videoconferencing Mode of feedback: Store and forward **Usual care** (n=23) The UC participants were asked to not participate in physical activities different from those that they would usually do during the protocol duration. **Concomitant therapy:** Provided to both groups initially. The ClinicHEAD training was supervised by physical therapists and psychologists. The VR image was projected on a television screen. Motor, cognitive and occupational exercises were integrated in a paradigm of VR activities. Both the active group participants and the usual care participants were invited to follow health recommendations of their physician or neurologist	Mean age (SD): 59.1 (12.8) years N = 34 Severity: Unclear/not stated Mean time period since stroke: Chronic (>6 months) Focus of care: Mixed (including multidisciplinary packages of care)	Physical function – upper limb at <6 months Stroke-specific measures of cognition (memory) at <6 months	Sources of funding: This research was supported by Fondazione Cariplo.

Study	**Intervention and comparison**	**Population**	Outcomes	Comments
	for their clinical conditions.			
Kirkness 2017[19]	**Combination of telerehabilitation and in person rehabilitation** (n=37) 'Living Well With Stroke 2 intervention':. Following the in-person orientation session, each of the subsequent 6 sessions occurred by telephone. Session length ranged from 10 to 80 minutes, with the telephone sessions somewhat shorter than the in-person ones (average 26 minutes versus 38 minutes). Minutes/hours of intervention per day: 1-2 hours Number of days of treatment per week: <5 days a week Mode of delivery: Telephone Mode of feedback: real time communication **In person rehabilitation** (n=63) 2 control groups combined for the purposes of this review. In person: The same 'Living Well With Stroke 2' intervention but provided in-person (usually in the participant's home). Control intervention: usual care **Concomitant therapy:** No additional information	**People after a first or recurrent stroke** Mean age: 57.1 years N = 100 Severity: Unclear/not stated Mean time period since stroke: Subacute (7 days - 6 months) Focus of care: Mood	Psychological distress – Depression at <6 months	Setting: Six university and community hospitals in the United States of America. Sources of funding: This work was funded by a Grant from the National Institute of Nursing Research, National Institutes of Health to Catherine J. Kirkness and Pamela H. Mitchell (multiple principal investigators), R01NR007755
Lee 2022[21]	**Combination of telerehabilitation and in person rehabilitation** (n=7) In addition to conventional physical therapy, 40-minute, non-face-to-face, dance-therapy sessions – twice a week for 3 weeks – with a dance instructor experienced in working with people with physical	**People after a first or recurrent stroke** Mean age (SD): 57.93 (16.14) years N = 14 Severity: Unclear/not stated Mean time period since stroke:	Person/participant generic health-related quality of life at <6 months Activities of daily living at <6 months Mobility at <6 months	Setting: Inpatients in the Department of Rehabilitation Medicine of Pusan National University Yangsan Hospital in the Republic of Korea. Sources of funding: This study was supported by

Study	**Intervention and comparison**	**Population**	Outcomes	Comments
	disabilities. The dance program was conducted in an independent space through real-time desktop videoconferencing using Zoom. Desktops and TV monitors with video cameras were installed in front of the space; this enabled the dance instructor to observe the participants and provide realtime feedback and modification as required. Minutes/hours of intervention per day: ≤45 minutes Number of days of treatment per week: <5 days per week Mode of delivery: Videoconferencing Mode of feedback: real time communication **In person rehabilitation** (n=7) Conventional physical therapy for the duration the experimental group received therapy (the dance program in addition to existing conventional physical therapy). **Concomitant therapy:** No additional information	Subacute (7 days – 6 months) Focus of care: Upper limb and lower limb	Balance at <6 months	Research Institute for Convergence of Biomedical Science and Technology Grant (30-2019-012), Pusan National University Yangsan Hospital.
Lloréns 2015[23]	**Combination of telerehabilitation and in person rehabilitation** (n=15) Participants underwent 20 x 45-minute training sessions with the telerehabilitation system, conducted 3 times a week. During the intervention, the difficulty of the task was adjusted either by the therapist or automatically by the system. The progress of all the participants was checked remotely once a week by PTA to detect possible issues and respond accordingly. In	**People after a first or recurrent stroke** Mean age (SD): 55.5 (8.5) years N = 31 Severity: Unclear/not stated Mean time period since stroke: Chronic (>6 months) Focus of care: Functional independency Balance	Balance at <6 months	Setting: Hospital and home based in Spain. Sources of funding: This study was funded in part by Ministerio de Economía y Competitividad, Project TEREHA (IDI-20110844), Ministerio de Educación y Ciencia, Projects Consolider-C (SEJ2006-14301/PSIC), "CIBER of Physiopathology of Obesity and

Study	**Intervention and comparison**	**Population**	Outcomes	Comments
	addition, PTB had a brief interview with participants of the experimental group each week to detect possible technical problems and to troubleshoot. The aim of the intervention was to improve balance. Minutes/hours of intervention per day: ≤45 minutes Number of days of treatment per week: 5 days per week Mode of delivery: Videoconferencing – Virtual reality Mode of feedback: real time communication **In person rehabilitation** (n=16) Participants belonging to the control group trained with the VR system in the clinic. **Concomitant therapy:** On the remaining days (Tuesday and Thursday), both groups received conventional physical therapy in the clinic.			Nutrition, an initiative of ISCIII" and the Excellence Research Program PROMETEO (Generalitat Valenciana. Conselleria de Educación, 2008-157).
Saywell 2021[34]	**Combination of telerehabilitation and in person rehabilitation** (n=47) ACTIV focused on 2 functional categories: "staying upright" and "using your arm." The program was delivered by physical therapists who had completed ACTIV training. Each participant received 4 face-to face visits, 5 structured phone calls, and personalized text messages. The phone calls focused on helping participants to maximize their engagement in the program. Text messages were used to encourage continuation of exercises	**People after a first or recurrent stroke** Mean age (SD): 73.5 (11.7) years N = 95 Severity: Unclear/not stated Mean time period since stroke: Chronic (>6 months) Focus of care: Upper limb Lower limb	Person/participant generic health-related quality of life at <6 months Balance at <6 months Stroke-specific Patient-Reported Outcome Measures at <6 months Withdrawal due to adverse events at <6 months	Setting: 4 community stroke rehabilitation centers across New Zealand Sources of funding: The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The Health Research Council of New Zealand 11/545.

Study	**Intervention and comparison**	**Population**	Outcomes	Comments
	and acknowledge participants' progress. Minutes/hours of intervention per day: Unclear/not stated Number of days of treatment per week: <5 days per week Mode of delivery: Telephone Mode of feedback: real time communication **Usual care** (n=48) Standard care following discharge from rehabilitation services in New Zealand usually means no further formal rehabilitation. To ensure usual care, no attempt was made to discourage any additional care, and this was not measured. **Concomitant therapy:** No additional information			
Zhou 2018[39]	**Combination of telerehabilitation and in person rehabilitation** (n=10) Computerised intervention for aphasia that combined speech-language and cognitive training - family topics communication for 30 min a day, with additional computerized speech-language and cognitive training, delivered via telerehabilitation, for 30 min a day for 30 consecutive days. Minutes/hours of intervention per day: ≤45 minutes Number of days of treatment per week: 7 days per week Mode of delivery: Unclear/not stated Mode of feedback: real time communication	**People after a first or recurrent stroke** Mean age (SD): 58.2 (13.0) years N = 20 Severity: Unclear/not stated Mean time period since stroke: Subacute (7 days - 6 months) Focus of care: Cognition Communication	Functional communication at <6 months	Setting: Jiangsu Provincial People's Hospital rehabilitation medicine center and home based in China Sources of funding: This work was supported by grants from the Natural Science Foundation of China (NSFC 31571156, 31871133) and grants from Jiangsu Province (BRA2017392, 2017-JY-025, H201670 and KYLX16_1302).

Study	Intervention and comparison	Population	Outcomes	Comments
	In person rehabilitation (n=10) The control group engaged in family topics communication for 30 min a session, 2 times a day for 30 days. **Concomitant therapy:** No additional information			

See Appendix D for full evidence tables.

1.1.6. Summary of the effectiveness evidence

1.1.6.1. Telerehabilitation compared to in person rehabilitation and usual care

Table 4: Clinical evidence summary: telerehabilitation compared to in person rehabilitation only

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with in person rehabilitation only	Risk difference with telerehabilitation	
Person/participant generic health-related quality of life (EuroQol-5D, 0-100, higher values are better, final value) at ≥6 months	30 (1 RCT) follow-up: mean 6 months	⊕⊕◯◯ Low[a]	-	The mean person/participant generic health-related quality of life at ≥6 months was 8.7	MD **13.3 higher** (7.89 higher to 18.71 higher)	MID = 3.75 (0.5 x median control SD)
Activities of daily living (Barthel index, 0-100, higher values are better, change scores and final value) at <6 months	119 (3 RCTs) follow-up: mean 9 weeks	⊕⊕◯◯ Low[b,c]	-	-	MD **4.14 higher** (0.06 higher to 8.23 higher)	(MID = 1.85 established MID)
Activities of daily living (Barthel index, 0-100, higher values are better, change score) at ≥6 months	50 (1 RCT) follow-up: 6 months	⊕◯◯◯ Very low[c,d]	-	-	MD **1.52 higher** (4.85 lower to 7.89 higher)	MID = 1.85 (established MID)
Balance (Berg balance scale, 0-56, higher values are better, change score and final value) at <6	75 (2 RCTs) follow-up: 2 months	⊕⊕⊕◯ Moderate[e]	-	-	MD **0.95 higher** (1.16 lower to 3.06 higher)	MID = 5.7 (0.5 x median baseline SD)

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with in person rehabilitation only	Risk difference with telerehabilitation	
months						
Balance (Berg balance scale, 0-56, higher values are better, change score) at ≥6 months	50 (1 RCT) follow-up: 6 months	⊕⊕⊕◯ Moderate[d]	-	-	MD **0.65 higher** (0.05 lower to 1.35 higher)	MID = 2.47 (0.5 x median baseline SDs)
Psychological distress - depression (Aphasic depression rating scale, 0-32, lower values are better, change score) at ≥6 months	30 (1 RCT) follow-up: 6 months	⊕⊕◯◯ Low[a]	-	The mean psychological distress - depression at ≥6 months was 2.3	MD **4.2 higher** (2.32 higher to 6.08 higher)	MID = 1.3 (0.5 x median control group SD)
Physical function - upper limb (Fugl-Meyer Assessment Upper Extremity, 0-66, higher values are better, change scores and final values) at <6 months	178 (4 RCTs) follow-up: mean 9 weeks	⊕⊕⊕⊕ High	-	-	MD **1.04 higher** (0.83 lower to 2.92 higher)	MID = 6.6 established MID (10% scale range)
Physical function upper limb (Fugl Meyer Assessment, 0-100, higher values are better, change score) at <6 months	44 (1 RCT) follow-up: 12 weeks	⊕⊕◯◯ Low[f,g]	-	The mean physical function upper limb at <6 months was 5.3	MD **5.8 higher** (1.61 higher to 9.99 higher)	MID = 10.0 established MID (10% scale range)
Physical function - upper limb (motor assessment log arm use, 0-5, higher values are better, change score) at <6 months	40 (1 RCT) follow-up: 10 days	⊕◯◯◯ Very low[a,c]	-	-	MD **0** (0.8 lower to 0.8 higher)	MID = 0.65 (0.5 x SD calculated from SE of mean difference)
Physical function - upper limb (motor assessment log arm use, 0-5, higher values are better, change score) at ≥6 months	40 (1 RCT) follow-up: 1 year	⊕◯◯◯ Very low[a,c]	-	-	MD **0.1 lower** (1.3 lower to 1.1 higher)	MID = 0.97 (0.5 x SD calculated from SE of mean difference)

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with in person rehabilitation only	Risk difference with telerehabilitation	
Stroke-specific measures of cognition - non-spatial attention and working memory (Cognitive linguistic quick test - attention, 0-215, higher values are better, change score) at <6 months	11 (1 RCT) follow-up: 10 weeks	⨁◯◯◯ Very low[c,h]	-	The mean stroke-specific measures of cognition - non-spatial attention and working memory at <6 months was 25.5	MD **23.1 lower** (50 lower to 3.8 higher)	MID = 13.85 (0.5 x median control group SD)
Stroke-specific measures of cognition - memory (Cognitive linguistic quick test - memory, 0-185, higher values are better, change score) at <6 months	11 (1 RCT) follow-up: 10 weeks	⨁◯◯◯ Very low[c,h]	-	The mean stroke-specific measures of cognition - memory at <6 months was 19.3	MD **16.9 lower** (37.61 lower to 3.81 higher)	MID = 11.45 (0.5 x median control group SDs)
Stroke-specific measures of cognition - executive functions (Cognitive linguistic quick test - executive function, 0-40, higher values are better, change score) at <6 months	11 (1 RCT) follow-up: 10 weeks	⨁◯◯◯ Very low[c,h]	-	The mean stroke-specific measures of cognition - executive functions at <6 months was 2.9	MD **1.5 lower** (5.18 lower to 2.18 higher)	MID = 0.9 (0.5 x median control group SD)
Stroke-specific Patient-Reported Outcome Measures (Stroke impact scale hand function, 0-100, higher values are better, change score) at <6 months	9 (1 RCT) follow-up: 5 months	⨁⨁◯◯ Low[i]	-	The mean stroke-specific Patient-Reported Outcome Measures at <6 months was 40	MD **65 lower** (102.42 lower to 27.58 lower)	MID = 16.2 (0.5 x median baseline SD)
Stroke-specific Patient-Reported Outcome Measures (Stroke impact scale activities of daily living, 0-100,	9 (1 RCT) follow-up: 5 months	⨁◯◯◯ Very low[c,i]	-	The mean stroke-specific Patient-Reported Outcome Measures at <6 months was 7	MD **12.5 lower** (27.69 lower to 2.69 higher)	MID = 9.5 (0.5 x median baseline SD)

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with in person rehabilitation only	Risk difference with telerehabilitation	
higher values are better, change score) at <6 months						
Stroke-specific Patient-Reported Outcome Measures (Stroke impact scale mobility, 0-100, higher values are better, change score) at <6 months	9 (1 RCT) follow-up: 5 months	⨁◯◯◯ Very low[c,i]	-	The mean stroke-specific Patient-Reported Outcome Measures at <6 months was 5.8	MD **7.05 lower** (19.41 lower to 5.31 higher)	MID = 7.8 (0.5 x median baseline SDs)
Withdrawal due to adverse events at <6 months	24 (1 RCT) follow-up: 10 days	⨁◯◯◯ Very low[c,h,j]	Peto OR 7.39 (0.15 to 372.38)	0 per 1,000	**80 more per 1,000** (from 120 fewer to 290 more) [j]	MID (precision) = Peto OR 0.80 – 1.25.
Withdrawal due to adverse events at ≥6 months	24 (1 RCT) follow-up: 1 year	⨁◯◯◯ Very low[c,h,j]	Peto OR 7.39 (0.15 to 372.38)	0 per 1,000	**80 more per 1,000** (from 120 fewer to 290 more) [j]	MID (precision) = Peto OR 0.80 – 1.25.

a. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions, bias due to missing outcome data and bias in measurement of the outcome)

b. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to a mixture of bias arising from the randomisation process, bias due to deviations from the intended interventions and bias in selections of the reported results)

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs

d. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias due to deviations from the intended interventions)

e. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to a mixture of bias arising from the randomisation process and bias due to deviations from the intended interventions)

f. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias in selection of the reported result)

g. Downgraded by 1 increment due to outcome indirectness (scale reported the upper and lower limb components of the Fugl Meyer assessment rather than just the upper limb scores)

h. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions and bias due to missing outcome data)

i. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to missing outcome data and bias in measurement of the outcome)

Table 5: Clinical evidence summary: telerehabilitation compared to usual care

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with telerehabilitation	
Activities of daily living (Barthel index, 0-100, higher values are better, final value) at <6 months	61 (1 RCT) follow-up: 3 months	⨁⨁◯◯ Low[a]	-	The mean activities of daily living at <6 months was 60.81	MD **4.26 higher** (1.89 higher to 6.63 higher)	MID = 1.85 (established MID)
Activities of daily living (Canadian Occupational Performance Measure performance untrained, 1-10, higher values are better, final value) at <6 months	17 (1 RCT) follow-up: 10 weeks	⨁◯◯◯ Very low[b,c]	-	The mean activities of daily living at <6 months was 1.88	MD **0.5 higher** (1.37 lower to 2.37 higher)	MID = 0.86 (0.5 x median baseline SD)
Activities of daily living (Canadian Occupational Performance Measure satisfaction untrained, 1-10, higher values are better, final value) at <6 months	17 (1 RCT) follow-up: 10 weeks	⨁◯◯◯ Very low[b,c]	-	The mean activities of daily living at <6 months was 1.67	MD **1.02 higher** (1.16 lower to 3.2 higher)	MID = 0.97 (0.5 x median baseline SD)
Activities of daily living (Barthel index, 0-100, higher values are better, final value) at ≥6 months	488 (1 RCT) follow-up: 6 months	⨁⨁⨁◯ Moderate[b]	-	The mean activities of daily living at ≥6 months was 19.3	MD **0** (0.36 lower to 0.36 higher)	MID = 1.85 (established MID)
Mobility (timed up and go [seconds], lower values are better, final value) at <6 months	61 (1 RCT) follow-up: 3 months	⨁⨁◯◯ Low[a]	-	The mean mobility at <6 months was 23.997 seconds	MD **4.5 seconds lower** (6.03 lower to 2.97 lower)	MID = 10 seconds (established MID)
Mobility (walking speed [meters/second], higher values	30 (1 RCT)	⨁◯◯◯ Very low[a,c]	-	The mean mobility at <6 months was 0.01	MD **0.09 meters/second lower** (0.32 lower	MID = 0.2 meters/second (chronic stroke

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with telerehabilitation	
are better, final value) at <6 months	follow-up: 12 weeks			meters/second	to 0.14 higher)	established MID)
Mobility (spanish version trunk impairment scale, 0-16, higher values are better, final value) at <6 months	38 (1 RCT) follow-up: 3 months	⨁◯◯◯ Very low[c,d]	-	The mean mobility at <6 months was 9.95	MD **0.4 lower** (3.13 lower to 2.33 higher)	MID = 2.3 (0.5 x median baseline SD)
Balance (Berg balance scale, 0-56, higher values are better, change score and final values) at <6 months	129 (3 RCTs) follow-up: 3 months	⨁◯◯◯ Very low[d,e]	-	The mean balance at <6 months was 24.2	MD **1.96 higher** (2.9 lower to 6.82 higher)	MID = 7 (0.5 x median baseline SD)
Psychological distress - depression (PHQ-9, 0-27, lower values are better, change score) at <6 months	17 (1 RCT) follow-up: 10 weeks	⨁⨁◯◯ Low[b,c]	-	The mean psychological distress - depression at <6 months was -1.63	MD **0.38 higher** (1.59 lower to 2.35 higher)	MID = 1.6 (0.5 x median baseline SD)
Psychological distress - depression (Center for Epidemiological Studies Depression scale, 0-60, lower values are better, final value) at <6 months	32 (1 RCT) follow-up: 11 weeks	⨁⨁◯◯ Low[c,f]	-	The mean psychological distress - depression at <6 months was 17.9	MD **3.9 lower** (9.45 lower to 1.65 higher)	MID = 6.6 (0.5 x median baseline SDs)
Psychological distress - depression (Hospital Anxiety and Depression subscale, 0-100, lower values are better, final value) at ≥6	479 (1 RCT) follow-up: 6 months	⨁⨁⨁◯ Moderate[b]	-	The mean psychological distress - depression at ≥6 months was 69.1	MD **2.4 higher** (1.2 lower to 6 higher)	MID = 10.0 (0.5 x median control group SD)

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with telerehabilitation	
months						
Physical function - upper limb (Fugl Meyer Assessment Upper Extremity, Late Life Function and Disability Instrument [different scale ranges], higher values are better, final values) at <6 months	115 (3 RCTs) follow-up: mean 12 weeks	⊕◯◯◯ Very low[c,e,g]	-	-	SMD **1.04 SD higher** (0.4 lower to 2.47 higher)	MID = 0.5 SD (SMD)
Physical function - upper limb (Late Life Function and Disability Instrument, 0-100, higher values are better, final value) at ≥6 months	43 (1 RCT) follow-up: 6 months	⊕⊕◯◯ Low[b,c]	-	The mean physical function - upper limb at ≥6 months was 64.3	MD **7.9 higher** (4.07 lower to 19.87 higher)	MID = 9.6 (0.5 x median baseline SDs)
Stroke-specific Patient-Reported Outcome Measures (Stroke specific Quality of Life, 49-245, higher values are better, final value) at <6 months	61 (1 RCT) follow-up: 3 months	⊕⊕◯◯ Low[a]	-	The mean stroke-specific Patient-Reported Outcome Measures at <6 months was 175.9	MD **14.6 higher** (11.87 higher to 17.33 higher)	MID = 2.17 (0.5 x median baseline SDs)
Withdrawal due to adverse events at <6 months	102 (2 RCTs)	⊕◯◯◯ Very low[c,h,i]	**RR 5.44** (0.93 to 31.89)	18 per 1,000	**78 more per 1,000** (1 fewer to 542 more)	MID (precision) = RR 0.80 – 1.25.

a. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process and bias due to deviations from the intended interventions)

b. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias due to missing outcome data)

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with telerehabilitation	
d. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions, bias due to missing outcome data and bias in measurement of the outcome) e. Downgraded by 1 or 2 increments because heterogeneity, unexplained by subgroup analysis f. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias in measurement of the outcome) g. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions, bias due to missing outcome data, bias in measurement of the outcome and bias in selection of the reported result) h. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions, bias due to missing outcome data and bias in measurement of the outcome) i. Downgraded for heterogeneity due to conflicting number of events in different studies (zero events in one or more studies)						

1.1.6.2. Combination of telerehabilitation and in person rehabilitation compared to in person rehabilitation and usual care

Table 6: Clinical evidence summary: combination of telerehabilitation and in person rehabilitation compared to in person rehabilitation

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with in person rehabilitation only	Risk difference with combination of telerehabilitation and in person rehabilitation	
Person/participant generic health-related quality of life (EQ-5D, -0.11-1, higher values are better, final value) at <6 months	14 (1 RCT) follow-up: 3 weeks	⊕◯◯◯ Very low[a,b]	-	The mean person/participant generic health-related quality of life at <6 months was 0.75	MD **0.02 higher** (0.08 lower to 0.12 higher)	MID = 0.03 (established MID)
Activities of daily living (Barthel index, 0-100, higher values are better, final value) at <6 months	14 (1 RCT) follow-up: 3 weeks	⊕⊕◯◯ Low[b]	-	The mean activities of daily living at <6 months was 73.86	MD **1.57 higher** (15.62 lower to 18.76 higher)	MID = (1.85 established MID)

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with in person rehabilitation only	Risk difference with combination of telerehabilitation and in person rehabilitation	
Mobility (timed up and go [seconds], lower values are better, final value) at <6 months	14 (1 RCT) follow-up: 3 weeks	⊕⊕◯ Moderate[b]	-	The mean mobility at <6 months was 22.86	MD **12.28 higher** (7.56 lower to 32.12 higher)	MID = 10 seconds (established MID)
Balance (Berg balance scale, 0-56, higher values are better, final values) at <6 months	44 (2 RCTs) follow-up: mean 8 weeks	⊕⊕◯ Moderate[c]	-	The mean balance at <6 months was 49.0	MD **0.07 lower** (2.77 lower to 2.63 higher)	MID = 3.5 (0.5 x median baseline SD)
Psychological distress - depression (Hamiliton depression rating scale, 0-56, lower values are better, final value) at <6 months	100 (2 RCTs) follow-up: mean 12 weeks	⊕⊕◯ Moderate[d]	-	The mean psychological distress - depression at <6 months was 10.2	MD **0.23 lower** (2.13 lower to 1.67 higher)	(MID = 4.6 (0.5 x median control group SD))
Stroke-specific measures of cognition - non-spatial attention and working memory (attentive matrices, scale range unclear, higher values are better, final value) at <6 months	35 (1 RCT) follow-up: 16 weeks	⊕◯◯◯ Very low[b,e]	-	The mean stroke-specific measures of cognition - non-spatial attention and working memory at <6 months was 37.7	MD **5.4 higher** (2.25 lower to 13.05 higher)	MID = 7.3 (0.5 x median baseline SD)
Stroke-specific measures of cognition - non-spatial attention and working memory (digital span, scale range unclear, higher values are better, final	35 (1 RCT) follow-up: 16 weeks	⊕◯◯◯ Very low[b,e]	-	The mean stroke-specific measures of cognition - non-spatial attention and working memory at <6 months was 4.3	MD **0.4 lower** (5.01 lower to 4.21 higher)	MID = 0.7 (0.5 x median baseline SD)

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with in person rehabilitation only	Risk difference with combination of telerehabilitation and in person rehabilitation	
value) at <6 months						
Functional communication (communication activities of daily living, scale range unclear, higher values are better, final value) at <6 months	20 (1 RCT) follow-up: 1 months	⊕◯◯◯ Very low[b,e]	-	The mean functional communication at <6 months was 31	MD **2.8 higher** (20.2 lower to 25.8 higher)	MID = 13.9 (0.5 x median baseline SD)

[a.] Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias in measurement of the outcome)

[b.] Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs

[c.] Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias in selection of reported result)

[d.] Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to a mixture of bias arising from the randomisation process, bias due to missing outcome data and bias in measurement of the outcome)

[e.] Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions and bias due to missing outcome data)

Table 7: Clinical evidence summary: combination of telerehabilitation and in person rehabilitation compared to usual care

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with combination telerehabilitation and in person rehabilitation	
Person/participant generic health-related quality of life	98 (1 RCT)	⊕◯◯◯ Very low[a,b]	-	-	MD **0.05 higher** (0.05 lower to	MID = 0.03 (established MID)

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with combination telerehabilitation and in person rehabilitation	
(EQ-5D, -0.11-1, higher values are better, change score) at <6 months	follow-up: 3 months				0.15 higher)	
Person/participant generic health-related quality of life (EQ-5D-5L, scale range unclear, lower values are better, change score) at <6 months	34 (1 RCT) follow-up: 3 months	⊕⊕◯◯ Low[c]	-	The mean person/participant generic health-related quality of life at <6 months was -1.31	MD **2.88 lower** (3.4 lower to 2.36 lower)	MID = 1.72 (0.5 x median baseline SDs)
Person/participant generic health-related quality of life (EQ-5D VAS, 0-100, higher values are better, change scores) at ≥6 months	75 (1 RCT) follow-up: 12 months	⊕◯◯◯ Very low[b,d]	-	-	MD **10.09 lower** (19.03 lower to 1.15 lower)	MID = 10 (0.5 x median baseline SD)
Activities of daily living (Barthel Index, Functional Independence Measure [different scale ranges], higher values are better, change scores) at <6 months	191 (4 RCTs) follow-up: mean 10 weeks	⊕◯◯◯ Very low[b,e,f]	-	-	SMD **0.08 SD lower** (0.57 lower to 0.41 higher)	MID = 0.5 SD (SMD)
Activities of daily living (Functional Independence Measure, 18-126, higher values are better, change	49 (1 RCT) follow-up: 6 months	⊕⊕◯◯ Low[g]	-	The mean activities of daily living at ≥6 months was -14.6	MD **1.3 lower** (13.64 lower to 11.04 higher)	MID = 22 (established MID)

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with combination telerehabilitation and in person rehabilitation	
score) at ≥6 months						
Mobility (timed up and go [seconds], lower values are better, final value) at <6 months	34 (1 RCT) follow-up: 3 months	⊕◯◯◯ Very low[b,h]	-	The mean mobility (timed up and go [seconds], lower values are better, final value) at <6 months was 4.67	MD **8.13 lower** (15.64 lower to 0.62 lower)	MID = 10 seconds (established MID)
Mobility (2 minute walk test [meters], higher values are better, change score and final value) at <6 months	132 (2 RCTs) follow-up: mean 3.5 months	⊕⊕◯◯ Low[a]	-	-	MD **6.15 lower** (18.26 lower to 5.96 higher)	(MID = 18.8 (0.5 x median baseline SD)
Mobility (2 minute walk test [meters], higher values are better, final value) at ≥6 months	34 (1 RCT) follow-up: 7 months	⊕◯◯◯ Very low[a,b]	-	The mean mobility at ≥6 months was 76.35	MD **14.29 higher** (18.29 lower to 46.87 higher)	MID = 22.0 (0.5 x median baseline SD)
Balance (activities specific balance confidence scale, 0-100, higher values are better, change score) at <6 months	98 (1 RCT) follow-up: 3 months	⊕⊕◯◯ Low[a]	-	-	MD **4.31 higher** (3.34 lower to 11.96 higher)	MID = 15.2 (0.5 x median baseline SD)
Balance (Berg balance scale, 0-56, higher values are better, change score and final value) at <6 months	44 (2 RCTs) follow-up: mean 10 weeks	⊕◯◯◯ Very low[b,d]	-	The mean balance at <6 months was 23.7	MD **3.92 higher** (0.58 lower to 8.41 higher)	MID = 6.2 (0.5 x median baseline SD)
Balance (step test [number of	75 (1 RCT)	⊕⊕⊕◯ Moderate[i]	-	-	MD **0.05 lower**	MID = 2.5 (0.5 x

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with combination telerehabilitation and in person rehabilitation	
steps], higher values are better, change score) at ≥6 months	follow-up: 12 months				(0.25 lower to 0.15 higher)	median baseline SD)
Balance (Berg balance scale, 0-56, higher values are better, final value) at ≥6 months	34 (1 RCT) follow-up: 7 months	⊕◯◯◯ Very low[a,b]	-	The mean balance at ≥6 months was 39.26	MD **4.19 higher** (6.81 lower to 15.19 higher)	MID = 7.8 (0.5 x median baseline SD)
Psychological distress - depression (Geriatric depression scale, 0-15, lower values are better, change score) at <6 months	49 (1 RCT) follow-up: 3 months	⊕◯◯◯ Very low[b,g]	-	The mean psychological distress - depression at <6 months was -1.27	MD **1.27 higher** (0.18 lower to 2.72 higher)	MID = 1.28 (0.5 x median baseline SD))
Psychological distress - depression (Geriatric depression scale, 0-15, lower values are better, change score) at ≥6 months	49 (1 RCT) follow-up: 6 months	⊕◯◯◯ Very low[b,g]	-	The mean psychological distress - depression at ≥6 months was -1.12	MD **1.81 higher** (0.02 higher to 3.6 higher)	MID = 1.28 (0.5 x median baseline SD)
Physical function - upper limb (Wolf motor function test [seconds], higher values are better, change score) at <6 months	83 (1 RCT) follow-up: 3 weeks	⊕⊕⊕◯ Moderate[i]	-	-	MD **0.04 lower** (0.22 lower to 0.14 higher)	MID = 19 seconds (established MIDs)
Physical function - upper limb (Action Research Arm	46 (2 RCTs)	⊕⊕◯◯ Low[b,j]	-	-	SMD **0.28 SD higher** (0.35 lower to	MID = 0.5 SD (SMD)

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with combination telerehabilitation and in person rehabilitation	
Test, Motricity Index [different scale ranges], higher values are better, final values) at <6 months	follow-up: mean 3 months				0.91 higher)	
Physical function - upper limb (Wolf motor function test [seconds], higher values are better, change score) at ≥6 months	83 (1 RCT) follow-up: 6 months	⊕⊕⊕◯ Moderate[i]	-	-	MD **0.14 higher** (0.22 lower to 0.5 higher)	MID = 19 seconds (established MID)
Physical function - upper limb (Motricity index, 0-100, higher values are better, final value) at ≥6 months	34 (1 RCT) follow-up: 7 months	⊕◯◯◯ Very low[a,b]	-	The mean physical function - upper limb at ≥6 months was 61.74	MD **14.53 higher** (3.32 lower to 32.38 higher)	MID = 12.9 (0.5 x median baseline SD)
Stroke-specific measures of cognition - memory (Rivermead behavioural memory test, 0-100, higher values are better, change score) at <6 months	34 (1 RCT) follow-up: 4 months	⊕⊕◯◯ Low[b,j]	-	The mean stroke-specific measures of cognition - memory at <6 months was 86.13	MD **5.51 higher** (8.38 lower to 19.4 higher)	MID = 8.8 (0.5 x median baseline SDs)
Stroke-specific measures of cognition - memory (Rivermead behavioural memory test, 0-100, higher values are	34 (1 RCT) follow-up: 7 months	⊕◯◯◯ Very low[a,b]	-	The mean stroke-specific measures of cognition - memory at ≥6 months was 88.6	MD **4.67 higher** (9.34 lower to 18.68 higher)	MID = 8.8 (0.5 x median baseline SDs)

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with combination telerehabilitation and in person rehabilitation	
better, change score) at ≥6 months						
Functional communication (communicative effectiveness index, 0-100, higher values are better, change score) at <6 months	62 (1 RCT) follow-up: 16 weeks	⊕⊕⊕⊕ High	-	-	MD **0.03 lower** (11.94 lower to 11.88 higher)	MID = 12.0 (0.5 x SD calculated from SE of mean difference)
Stroke-specific Patient-Reported Outcome Measure (Stroke Impact Scale, 0-100, higher values are better, change score) at ≥6 months	75 (1 RCT) follow-up: 12 months	⊕⊕◯◯ Low[d]	-	-	MD **0.64 higher** (7.65 lower to 8.93 higher)	MID = 9.9 (0.5 x median baseline SD)
Withdrawal due to adverse events at <6 months	62 (1 RCT)	⊕⊕◯◯ Low[b]	**Peto OR 6.94** (0.14 to 350.54)	0 per 1,000	**30 more per 1,000** (50 fewer to 120 more) [k]	MID (precision) = Peto OR 0.80 – 1.25.
Withdrawal due to adverse events at ≥6 months	95 (1 RCT)	⊕◯◯◯ Very low[b,d]	**RR 1.02** (0.15 to 6.95)	42 per 1,000	**1 more per 1,000** (35 fewer to 248 more)	MID (precision) = RR 0.80 – 1.25.

[a.] Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process and bias due to missing outcome data)

[b.] Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs

[c.] Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions and bias in measurement of the outcome)

[d.] Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias due to missing outcome data and bias in measurement of the outcome)

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects		Comments
				Risk with usual care	Risk difference with combination telerehabilitation and in person rehabilitation	

e. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions, bias due to missing outcome data and bias in measurement of the outcome)

f. Downgraded by 1 or 2 increments because heterogeneity, unexplained by subgroup analysis

g. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process)

h. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process and bias due to deviations from the intended interventions)

i. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias due to missing outcome data)

j. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias arising from the randomisation process)

k. Absolute effect calculated by risk difference due to zero events in at least one arm of one study

See Appendix F for full GRADE tables

1.1.7. Economic evidence

1.1.7.1. Included studies

Two health economic studies with relevant comparisons were included in this review.[23, 37] The first study[23] compared a virtual reality (VR)-based balance recovery telerehabilitation programme at-home versus in-clinic, with both groups receiving standard rehabilitation. The second study[37] compared a home-based written exercise programme plus a VR-based home exercise programme to the written exercise programme alone. These are summarised in the health economic evidence profile below (Table 8) and the health economic evidence tables in Appendix H.

1.1.7.2. Excluded studies

No relevant health economic studies were excluded due to assessment of limited applicability or methodological limitations.

See also the health economic study selection flow chart in Appendix C.

1.1.8. Summary of included economic evidence

Table 8: Health economic evidence profile: Telerehabilitation versus usual care

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Llorens 2015[23] (Spain)	Partially applicable[(a)]	Potentially serious limitations[(b)]	• Within trial analysis of a single-blind RCT (n=30) included in the clinical review (same paper) without any modelled extrapolation • Cost-effectiveness analysis (health outcome: Berg Balance scale) • Population: Outpatients who were >6 months post-stroke and had internet access in their homes. Comparators: 1. In-person VR balance training conducted in a clinic plus usual rehabilitation for 8 weeks (n=15). A physical therapist monitored the performance of the participant with the system while assisting other patients. 2. VR-based balance recovery telerehabilitation program conducted in the participant's home plus usual rehabilitation for 8 weeks (n=15). Progress was monitored remotely by a physical therapist once per week. Follow-up: 12 weeks	2 vs 1: Saves £457[(c)]	From clinical review (2-1):[(d)] **Balance (BBS, final values) at <6 months:** 0.26 (95% CI: -2.53 to 3.05)	Results suggest that home-based VR balance recovery telerehabilitation is dominant (lower costs and improved outcomes) compared to in-person VR balance training, however no significant differences were found between the groups in any balance scale or in the feedback questionnaires.	No sensitivity analyses undertaken.
Veras 2020[37] (Canada)	Partially applicable[(e)]	Potentially serious limitations[(f)]	• Within-trial analysis (single-blind pilot RCT (n=51) –NR). • Comparative cost analysis (no health outcomes) • Population: Post-stroke adults with mild to moderate upper limb impairment (score 3-6	Total costs (2 vs 1): £400[(g)] Total costs minus	NA	NR	Hypothetical scenario of a permanent 1-month program used by 40 (as

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
			Chedoke-McMaster) who were no longer receiving rehabilitation services. • Comparators: 1. Control group (n=25) received a written home exercise program during an initial PT appointment and were asked to perform exercises at least 5 times per week for 30 minutes a day, for 4 weeks. There were no additional PT visits. 2. Home-based telerehabilitation (TR) platform (Jintronix system) using virtual reality (VR) plus the written exercise program (n=26). Participants were introduced to the system during an initial PT appointment, during which the at-home exercise program was designed for the participant. Participant performance was logged by the TR platform and monitored off-line by the therapist (total monitoring time of 75 minutes). Follow-up: 4 weeks	computer equipment and internet access (2 vs 1): £163[(h)]			opposed to 26) participants per year was estimated to have a total incremental cost of £264 per person (£135 if participants do not require computer equipment and internet access).

Abbreviations: BBS= Berg Balance Scale (scale=0-56, higher values are better); ICER= incremental cost-effectiveness ratio; NA= not applicable; NR= not reported; PT= physiotherapist; QALY= quality-adjusted life years; RCT= randomised controlled trial; VR= virtual reality

(a) QALYs (and cost per QALY gained) were not presented. 2014 Spanish healthcare system may not reflect UK NHS context.

(b) Within-trial analysis based on a single RCT and so only reflects this study and not the wider evidence base identified in the clinical review. 12-week follow-up may not sufficiently assess the full costs and benefits. References for unit costs (including cost year) were not reported which limits interpretation of results for UK context. No sensitivity analyses were performed on parameters of uncertainty.

(c) 2014 US dollars ($) converted to UK pounds.[29] Cost year was assumed to be 2014 based on year of study submission as this was not reported. Cost components incorporated: Human resources (time spent on assistance and guidance during the intervention, monitoring of progress, and troubleshooting), round trips to the neurorehabilitation unit, and instrumentation (laptop, Kinect camera (to record patients' movements) and Internet access).

(d) Mean difference taken from figure 34 of guideline clinical review.

(e) QALYs (and cost per QALY gained) were not presented. 2015 Canadian perspective may not reflect UK NHS context.

(f) Within-trial analysis based on a single-blind RCT not included in the clinical review and so only reflects this study. 4-week follow-up may not sufficiently assess the full costs and benefits. References for unit costs were not reported which limits interpretation of results for UK context. No probabilistic sensitivity analyses were performed.

(g) 2015 Canadian dollars ($) converted to UK pounds.[29] Cost components incorporated: VR hardware (computer, screen, keyboard, mouse, Internet connection, and the Kinect camera), monthly fees for software rental and internet access, installation and removal of equipment and staff time for physiotherapist (to monitor performance) and VR technician (to assist with hardware issues).

(h) Costed as such to account for participants already in possession of the necessary computer equipment and internet access at home, but not the Kinetic camera to record their exercise program.

1.1.9. Economic model

This area was not prioritised for new cost-effectiveness analysis.

1.1.10. Unit costs

Studies included in the clinical review reported varied resource use (see Table 2 and

Table 3 for details) due to the following factors listed below:

- Equipment required: several studies used videoconferencing via platforms such as Zoom to allow therapists to supervise therapy, which may be cost saving as staff time could be used more efficiently between appointments and would not require the use of a therapy room. One study (Grau-Pellicer 2020[15]) also assessed a free application (mHealthapp) that stores and records patient performance for staff to monitor progress off-line, which could further improve staff time efficiency.
- More costly interventions were also reported, including VR programs (Allegue 2022[1]), in-home messaging devices (Chumbler 2012[9]) or interactive games that required touch screens or tablets (Maresca 2019[24]). A significant resource impact would be incurred for the NHS in cases where patients do not currently possess the necessary technology to facilitate telerehabilitation (for example computer equipment or internet access). One of the economic analyses included in the review[37] accounted for this and estimated that providing computer and internet access increased the cost of a 4-week VR balance program (Jintronix) by approximately £237 (£400 versus £163 per participant).
- Additional resource use required also depended on the use of staff training, educational or instructional videos, telephone calls and text messages between staff and patients and monthly program subscription fees.
- The frequency and duration of therapy delivered also varied, as sessions ranged from 20-60 minutes, occurring 2-5 days per week, with interventions lasting between 3 weeks to 3 months. Staff time also varied depending on whether patients required hardware assistance from a technician.
- Additional resource use would be incurred from studies reporting an initial therapy appointment aimed at designing the telerehabilitation program according to patient need. Home visits to patients also incurs additional resource use from travel time and therapy set-up for rehabilitation staff.

Relevant unit costs are provided below to aid consideration of cost effectiveness.

Table 9: Unit costs of healthcare professionals who may be involved in delivering Telerehabilitation

Resource	Cost per working hour[(a)]		Source
	Hospital	Community	
Band 5/6/7 Nurse	£44/£54/£64	£47/£58/£69	PSSRU 2021[17]
Band 5/6/7 PT/OT/Dietitian	£41/£53/£64	£42/£55/£67	PSSRU 2021[17]
Band 5/6/7 psychologist			PSSRU 2021[17], assumed to be the same as dietitian[(b)]
Band 3 Clinical support worker higher level (physiotherapy)	£33	£32	PSSRU 2021[17] Estimated based on Agenda for Change Band 3 salary[(c)]

Abbreviations: OT= occupational therapist; PT= physiotherapist

(a) Note: Costs per working hour include salary, salary oncosts, overheads (management and other non-care staff costs including administration and estates staff), capital overheads and qualification costs.
(b) Same assumption was used in the NICE chronic pain guideline[26]
(c) Band 3 PT not in PSSRU 2021 so salary was assumed to equal Band 3 Mean annual basic pay per FTE for administration and estates staff, NHS England (PSSRU2021 p.149[17])

1.1.11. Evidence statements

1.1.11.1. Effectiveness/Qualitative

1.1.11.2. Economic

- One cost-effectiveness analysis found that a VR-based balance recovery telerehabilitation programme incurred lower costs (£457 less per participant) compared to the same program conducted in a clinical setting for adults who had experienced a stroke more than six months prior. No significant differences were found between the groups in any balance scale or in the feedback questionnaires. This study was assessed as partially applicable with potentially seriously limitations.

- One comparative cost analysis found that for post-stroke adults with an upper limb impairment, home-based telerehabilitation platform (Jintronix system) using VR plus the written exercise programme in incurred higher costs (£400 per participant) compared to a control group receiving the written exercise programme alone. The additional cost was reduced (£163 more per participant) for a scenario that assumed participants were in current possession of the necessary computer equipment and internet access. This study was assessed as partially applicable with potentially seriously limitations.

1.1.12. The committee's discussion and interpretation of the evidence

1.1.12.1. The outcomes that matter most

The committee included the following outcomes: person/participant generic health-related quality of life, carer generic health-related quality of life, activities of daily living, mobility, balance, psychological distress - depression, physical function - upper limb, stroke specific measures of cognition, swallow function and ability, functional communication, stroke-specific Patient-Reported Outcome Measures and withdrawal due to adverse events. All outcomes were considered equally important for decision making and therefore have all been rated as critical.

This review updated a published Cochrane review by Laver 2020. Therefore, the outcomes used in this review are the same as those reported in the Cochrane review with the inclusion of 4 additional outcomes measures which were agreed by the guideline committee: carer generic health-related quality of life, swallow function and ability, stroke-specific Patient-Reported Outcome Measures and withdrawal due to adverse events.

Person/participant health-related quality of life was considered particularly important as a holistic measure of the impact on the person's quality of living. Withdrawal due to adverse events was important to understand if any negative consequences can be attributed to the intervention and lack of physical supervision (for example: falls) and the committee acknowledged that these may differ depending on the type of intervention and the focus of care. Mortality was not considered as it was deemed unlikely to be a direct result of the treatment and would be included in withdrawal due to adverse events. If mortality was reported as an adverse event, then this was highlighted to the committee during their deliberation.

The committee chose to investigate these outcomes at less than 6 months and greater than and equal to 6 months, as they considered that there could be a difference in the short term and long-term effects of the interventions.

The evidence for this question was limited, and in many cases only comprised of one study per outcome. Some outcomes were not reported in every comparison. No study investigated the effects of telerehabilitation on carer generic health-related quality of life or swallow function and ability. The majority of outcomes were reported at less than 6 months and the most widely reported outcomes were activities of daily living, mobility, balance and physical function – upper limb.

1.1.12.2. The quality of the evidence

Thirty-one randomised control trial studies were included in the review. Outcomes ranged from high to very low quality, with the majority being of low and very low quality. This was mainly due to risk of bias and imprecision.

Risk of bias was mainly due to bias arising from the randomisation process, bias due to deviations from the intended intervention and bias due to missing outcome data. However, all reasons for downgrading outcomes for risk of bias were present at least once during the analysis.

A large number of outcomes were downgraded due to imprecision and uncertainty around the effect estimate. This was likely due to the included studies comprising of small populations (study sample sizes ranged from 9 to 536 participants), and that there were limited studies to meta-analyse to improve the precision in the outcome.

Where meta-analysis was conducted, three outcomes were downgraded for inconsistency due to heterogeneity. Sensitivity and subgroup analyses generally did not resolve the heterogeneity due to there being an insufficient number of studies included in the results to allow for valid subgroups to be formed.

The committee noted that studies took place in a wide range of countries worldwide and no studies were based in the UK, which may limit applicability to the NHS. These factors introduced additional uncertainty in the results. The committee took all of these factors into account when interpreting the evidence.

1.1.12.3. Benefits and harms

Telerehabilitation compared to in person rehabilitation and usual care

Telerehabilitation was compared to in person rehabilitation and usual care. The results showed that, when compared to in person rehabilitation, there were clinically important benefits of telerehabilitation for person/participant health-related quality of life at greater than and equal to 6 months and activities of daily living at less than 6 months. Clinically important harms were identified in psychological distress - depression, stroke specific measures of cognition, 2 stroke-specific Patient-Reported Outcome Measures and withdrawal due to adverse events. There were no clinically important differences seen for activities of daily living at greater than and equal to 6 months, along with balance and physical function – upper limb at both follow up time points. One stroke-specific Patient-Reported Outcome Measure also reported no difference at less than 6 months.

When telerehabilitation was compared to usual care, there were clinically important benefits of telerehabilitation for activities of daily living, physical function – upper limb and stroke specific patient reported outcomes at less than 6 months. A clinically important harm was reported for withdrawal due to adverse events at less than 6 months and no clinically important differences were seen for activities of daily living at greater than and equal to 6

months, mobility, balance, psychological distress – depression, and physical function – upper limb at greater than and equal to 6 months.

The committee discussed the benefit reported for person/participant generic health-related quality of life at greater than and equal to 6 months as this was highlighted as an important outcome. They noted that this benefit came from one small study looking at an app-based speech and language therapy intervention for aphasia. While this was a clinically important benefit for person/participant generic health-related quality of life they also acknowledged that the same study reported a harm for physiological distress - depression at greater than and equal to 6 months. This led them to conclude that, while telerehabilitation interventions may improve some aspects of quality of life, they could also have a negative impact on others and further research may be required to investigate this. The committee suggested that mood should be monitored closely when delivering interventions remotely. Due to the study population, they noted that this may be particularly important for people with speech and language difficulties, who may be impacted by the lack of face-to-face interaction or support.

The committee considered the clinically important harm for withdrawal due to adverse events that was present in both comparisons. This outcome was reported by 1 study when compared to in-person rehabilitation and 2 studies when compared to usual care. Both outcomes were rated very low quality and had small sample sizes. The committee acknowledged the reasons for withdrawal, which were either due to unrelated medical complications or mortality. 3 people died in the telerehabilitation group compared to 1 in the usual care group. Ultimately the committee, agreed that there was insufficient evidence to draw any conclusions from these results and these events were unlikely to be attributable to the intervention. Therefore, they did not give this significant weight in their decision making.

The committee discussed the clinically important harms present for stroke specific measures of cognition. These were reported in one small study examining a combined speech and language therapy and cognitive rehabilitation intervention. However, the committee were wary of drawing any conclusions from these findings due to the small sample size of only 11 participants and outcomes of very low quality. There was a similar consensus for the harm reported in the stroke-specific Patient-Reported Outcome Measures, measured on the stroke impact scale. The committed noted this data came from 1 study of 9 participants, that took place during the COVID-19 pandemic and involved several protocol breaches which likely influenced the results. The committee took this into account when considering these findings.

The committee considered the large number of outcomes that reported no clinically important differences across both comparisons. In the context of this review, they agreed that these outcomes should be considered as positive results. They noted this was particularly evident when compared to in person rehabilitation (which was time matched to the telerehabilitation group) as they indicate no difference between telerehabilitation and in-person rehabilitation. This conclusion was echoed by several lay members, who had received telerehabilitation since the COVID-19 pandemic and reported that the interventions worked equally effectively. However, they highlighted that they needed greater self-motivation to stay engaged with the therapy and they missed the in person interaction. They noted that the outcomes where harms were noted came from small studies where there was very low quality evidence and so, when balanced against the evidence of equivalent or clinically important benefits in outcomes, telerehabilitation appeared to be a clinically effective method for supporting people after stroke.

Combined telerehabilitation compared to in person rehabilitation and usual care

Combination telerehabilitation was compared to in-person rehabilitation and usual care. The results showed that, when compared to in-person rehabilitation, there was a clinically important benefit of combined telerehabilitation for person/participant health-related quality of life at less than 6 months. No clinically important difference was reported in activities of daily living, balance, psychological distress - depression, 2 stroke specific measures of cognition,

and functional communication at less than 6 months. A clinically important harm was reported for mobility at less than 6 months.

When combination telerehabilitation was compared to usual care there were benefits reported for 2 of the person/participant generic health-related quality of life outcomes at less than 6 months and physical function – upper limb at more than and equal to 6 months. No clinically important differences were reported for activities of daily living, mobility, balance, physical function - upper limb, stroke specific measures of cognition, functional communication, stroke specific patient-reported reported outcomes and withdrawal due to adverse events at less than and more than and equal to 6 months. A clinically important harm was reported for person/participant generic health-related quality of life at more than and equal to 6 months and psychological distress – depression at less than and more than and equal to 6 months.

The committee considered the evidence across both comparisons and noted the improvements in person/participant generic health-related quality of life at less than 6 months in both, which were based on 3 physiotherapy/occupational therapy-based interventions. The committee considered this to be a positive finding in favour of telerehabilitation, but they recognised the small sizes and potential bias due to selective reporting (one study was unclear in their reporting of EQ-5D) when making their decisions. The committee judged these benefits against the borderline harm for person/participant health-related quality of life reported by one study at 12 months. They noted that this was a long follow up time point for a 6 month intervention and agreed that any changes to person/participant generic health-related quality of life at that time may not be attributable to the intervention (particularly as same outcome at the 6 month follow up time point reported the opposite effect). One lay member suggested that a big benefit of telerehabilitation is not having to leave the home for therapy sessions, particularly in the sub-acute post stroke period. Getting to appointments, particularly when relying on public transport, can be unsettling and stressful during this time and could explain the benefit in person/participant health-related quality of life with telerehabilitation at the less than 6 months follow up. Additionally, rehabilitation delivered in the home environment can be tailored to personal goals or functional tasks and allows family members or careers to join in which may improve overall quality of life.

The committee once again highlighted the clinically important harm present for psychological distress depression, reported by one study at both follow up time points. They considered that this study was a family-based telephone intervention focused on psychoeducation, family functioning and functional independence and compared to standard medical follow up. The committee were therefore surprised by the negative finding but noted that baseline values for depression were very low and fell within the non-depressed range, which may explain the lack of efficacy for this outcome. However, the committee still agreed that psychological distress and the wellbeing of the stroke survivor should be closely monitored throughout the delivery of telerehabilitation interventions. This was reiterated by one committee member who highlighted that increases in stress and depression were notable during the COVID-19 pandemic when a number of services switched from face to face to fully remote delivery.

The committee concluded that overall, the results were positive and appeared to display a benefit or equal effect of telerehabilitation and combined telerehabilitation when compared to in person rehabilitation or usual care. While several harms were present the committee agreed that generally these were based on small studies with high risk of bias and therefore their applicability was limited.

Several committee members agreed that these findings are generally in line with what they see in current practice. They suggest that a number of services are already being delivered via the telephone or teleconferencing since the COVID-19 pandemic and are having comparable effects to usual care.

The committee agreed that there did not appear to be any additional benefit of combination telerehabilitation over telerehabilitation delivered alone, although direct comparison of the 2 types of telerehabilitation was beyond the scope of this review. The committee therefore decided to make one recommendation for both types of telerehabilitation and agreed that it could be delivered independently or in conjunction with face to face rehabilitation depending on clinical justification.

1.1.12.4. Cost effectiveness and resource use

Two economic evaluations with relevant comparisons were included in this review, both of which assessed virtual reality (VR) programs. The first study was a cost-effectiveness analysis that compared a VR-based balance recovery telerehabilitation program at-home versus in-clinic, with both groups receiving standard rehabilitation. The results found that the clinic-based virtual reality program incurred higher costs (£457 more per patient) compared to home-based virtual reality telerehabilitation, with no significant differences were found between the groups in any balance scale or in the feedback questionnaires. The study was assessed as partially applicable as QALYs (and cost per QALY gained) were not presented, as well as the analysis having the perspective of the 2014 Spanish healthcare system, which may not reflect the current UK NHS context. Potentially serious limitations were identified, as the study was a within-trial analysis based on a single RCT and so only reflects this study and not the wider evidence base identified in the clinical review. The 12-week time horizon may also not sufficiently assess the full costs and benefits, and references for unit costs (including cost year) were not reported which limits interpretation of results for UK context. Finally, no sensitivity analyses were performed on parameters of uncertainty.

The second study was a comparative cost analysis based on a single-blind pilot RCT, that compared a control group who received a written exercise program to home-based telerehabilitation platform (Jintronix system) using VR plus the written exercise program. The results found that the total costs were higher for the home-based telerehabilitation VR program (£400 more per patient) compared to the control group. This incremental cost fell (£163 more per patient) when a scenario was applied that assumed participants already were in possession of the necessary computer equipment and internet access at home, but not the Kinetic camera to record their exercise program.

An additional hypothetical scenario was considered, where the total costs from the pilot 4-week program were extrapolated to one year in order to estimate the cost of a fully operational permanent program. Considering there were 4 complete sets of equipment available, and that each set of equipment could be used by 10 patients per year, allowing one week for the equipment to be switched between patients, it was assumed that the fully operational programme would be used by 40 patients per year. The results for this scenario estimated the incremental cost of a permanent 1-month program used to be £264 per person (or £135 if participants do not require computer equipment and internet access). This study was considered to be partially applicable as no health outcomes were reported (including no QALYs or cost per QALY gained) and the 2015 Canadian societal perspective may not reflect a UK NHS context. Potentially serious limitations included how this was a within-trial analysis based on a single-blind RCT not included in the clinical review and so the results only reflected this study. The 4-week follow-up may not sufficiently assess the full costs and references for unit costs were not reported which limits interpretation of results for UK context. No probabilistic sensitivity analyses were performed either.

In addition to published economic studies, relevant unit costs were presented to the committee to aid consideration of cost effectiveness of telerehabilitation. In the clinical review, combination telerehabilitation interventions required additional resource use compared to usual care alone, related to staff time and equipment, while interventions consisting of telerehabilitation alone could potentially incur less resource use if compared to usual care provided in both inpatient and outpatient rehabilitation settings.

Studies included in the clinical review reported varied resource use, which was largely attributable to equipment requirements, as several studies used videoconferencing via platforms such as Zoom to allow therapists to supervise therapy, which may be cost saving as staff time could be used more efficiently between appointments and would not require the use of a therapy room. One study also assessed a free application that stores and records patient performance for staff to monitor progress off-line, which could further improve staff time efficiency. More costly interventions were also reported, including VR programs, in-home messaging devices or interactive games that required touch screens or tablets. The frequency and duration of therapy delivered also varied, with sessions ranging from 20-60 minutes, occurring 2-5 days per week for between 3 weeks and 3 months. Staff time requirements were also dependent on whether an initial therapy appointment was needed to design the program according to patient need or if patients required hardware assistance from a technician. Studies also mentioned resource use such as staff training, educational or instructional videos, telephone calls and text messages between staff and patients and monthly program subscription fees as part of the intervention, with interventions including home visits to patients incurring additional costs from travel time and therapy set-up for rehabilitation staff.

Committee members' personal experience was that the use of telerehabilitation services varies across current practice and in some rural areas telerehabilitation is the main option for people to access rehabilitation and that platforms such as Zoom are frequently used for check-ups. Following the results of the clinical review, the committee acknowledged that the evidence was limited and that none of the studies were based in the UK, however clinically important benefits were seen for telerehabilitation both when compared to usual care and when combined with usual care and compared to in-person rehabilitation and usual care for activities of daily living, physical function – upper limb.

The committee felt that the economic evidence was limited as it focused on VR programs when videoconferencing interventions are more commonly used in current practice and are also considered to incur cost-savings from increasing staff-time efficiency and reducing the demand for therapy rooms. In addition, a significant resource impact would be incurred for the NHS in cases where patients do not currently possess the necessary technology to facilitate telerehabilitation.

Concerns were raised towards what proportion of the population would be eligible for telerehabilitation as some people may lack confidence in engaging with technology while those with more severe cases of stroke may have difficulty in concentrating over a screen for extended periods of time. One benefit of telerehabilitation noted however was that it can serve individuals who have logistical difficulties with attending in-person rehabilitation (for example they live in a rural area or require carer assistance) or find it daunting to use public transportation. Providing telerehabilitation could therefore result in better quality of life for those who have no alternative access to rehabilitation services. This also has the potential to lower resource use in instances where the NHS is funding transportation to access rehabilitation.

Considering the limited economic and clinical evidence, the committee made a 'consider' recommendation for telerehabilitation services as an alternative or adjunct to face-to-face therapy if this aligns with patient goals and in agreement between the patient and therapist/clinician.

1.1.12.5. Other factors the committee took into account

The committee were unable to make recommendations for individual therapy types as the results were pooled together in the analyses. They noted that physiotherapy interventions and occupational therapy interventions in particular appeared to be effective, but less evidence was available for the other therapy types. The committee therefore considered all

forms of therapy could be considered for telerehabilitation as long as individual needs, preferences, and impairments are taken into account.

The committee highlighted a number of barriers to telerehabilitation that should be considered during the assessment of suitability for these programmes. One issue was surrounding 'digital poverty' whereby, people are unable to engage in online rehabilitation either due to lack of knowledge, availability of the technology or location (living in remote locations where signal is an issue). The committee also highlighted that specific populations may face increased challenges in using information technologies, for example, people with cognitive, visual or other impairments.

The committee discussed issues surrounding implementation of telerehabilitation and specifically queried if formal training would be required for all clinicians. Several committee members suggested that telerehabilitation is already current practice for a number of services and formal training was not required. However, others suggested that some form of competency based training should be carried out. In the absence of any evidence on this point, and uncertainty about the availability of recognised training, the committee were unable to come to an agreement on whether specialist training for telerehabilitation interventions would be needed. This may depend on the therapy or type of intervention delivered, along with the information technology being used.

The impact of telerehabilitation on carers was not captured in the clinical evidence. Although, several studies examined stroke survivor and carer dyads, these studies did not report any carer generic health-related quality of life measures - which was the only carer specific outcome measure included in the protocol. The committee agreed that it was important to highlight the impact that these interventions could have on carers. For example, telerehabilitation could lead to increased carer burden due to them needing to physically assist with the rehabilitation or be responsible for the setting up of any equipment. However, on the contrary, one lay member noted that it may ease the pressure on carers if they do not need to travel to face to face appointments. Therefore, carers needs and preferences should also be taken into account when prescribing telerehabilitation interventions.

Several lay members highlighted the importance of having an open communication channel between the therapist and stroke survivor during telerehabilitation to limit social isolation and to maintain motivation and engagement with therapy. They specified that telerehabilitation interventions must involve a two-way communication channel whereby the stroke survivor can feedback to the clinician (as specified in the inclusion criteria for clinical evidence). This could be through the use of video conferencing, the telephone or other form of information technology device depending on the needs and preferences of the person.

1.1.13. Recommendations supported by this evidence review

This evidence review supports recommendations 1.3.1 to 1.3.3 and the recommendation for research on the impact of telerehabilitation on cognition and mood in Appendix K.

1.1.14. References

1. Allegue DR, Higgins J, Sweet SN, Archambault PS, Michaud F, Miller W et al. Rehabilitation of Upper Extremity by Telerehabilitation Combined With Exergames in Survivors of Chronic Stroke: Preliminary Findings From a Feasibility Clinical Trial. JMIR Rehabilitation And Assistive Technologies. 2022; 9(2):e33745

2. Asano M, Tai BC, Yeo FY, Yen SC, Tay A, Ng YS et al. Home-based tele-rehabilitation presents comparable positive impact on self-reported functional outcomes as usual care: The Singapore Tele-technology Aided Rehabilitation in Stroke (STARS) randomised controlled trial. Journal of Telemedicine and Telecare. 2021; 27(4):231-238

3. Bishop D, Miller I, Weiner D, Guilmette T, Mukand J, Feldmann E et al. Family Intervention: Telephone Tracking (FITT): a pilot stroke outcome study. Topics in Stroke Rehabilitation. 2014; 21(Suppl 1):63-74

4. Bizovicar N, Rudolf M, Javh M, Goljar N, Rudel D, Obrzan D et al. Tele-rehabilitation service at home for patients after stroke. Cerebrovascular Diseases. 2017; 43(Suppl 1):61

5. Boter H, Hestia Study G. Multicenter randomized controlled trial of an outreach nursing support program for recently discharged stroke patients. Stroke. 2004; 35(12):2867-2872

6. Burgos PI, Lara O, Lavado A, Rojas-Sep?lveda I, Delgado C, Bravo E et al. Exergames and Telerehabilitation on Smartphones to Improve Balance in Stroke Patients. Brain Sciences. 2020; 10(11)

7. Chen J, Jin W, Dong WS, Jin Y, Qiao FL, Zhou YF et al. Effects of Home-based Telesupervising Rehabilitation on Physical Function for Stroke Survivors with Hemiplegia: A Randomized Controlled Trial. American Journal of Physical Medicine and Rehabilitation. 2017; 96(3):152-160

8. Chen J, Sun D, Zhang S, Shi Y, Qiao F, Zhou Y et al. Effects of home-based telerehabilitation in patients with stroke: A randomized controlled trial. Neurology. 2020; 95(17):e2318-e2330

9. Chumbler NR, Quigley P, Li X, Morey M, Rose D, Sanford J et al. Effects of telerehabilitation on physical function and disability for stroke patients: a randomized, controlled trial. Stroke. 2012; 43(8):2168-2174

10. Cramer SC, Dodakian L, Le V, See J, Augsburger R, McKenzie A et al. Efficacy of Home-Based Telerehabilitation vs In-Clinic Therapy for Adults After Stroke: A Randomized Clinical Trial. JAMA neurology. 2019; 76(9):1079-1087

11. Dawson DR, Anderson ND, Binns M, Bar Y, Chui A, Gill N et al. Strategy-training post-stroke via tele-rehabilitation: a pilot randomized controlled trial. Disability and Rehabilitation. 2022:1-10

12. De Luca R, Leonardi S, Spadaro L, Russo M, Aragona B, Torrisi M et al. Improving Cognitive Function in Patients with Stroke: Can Computerized Training Be the Future? Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association. 2018; 27(4):1055-1060

13. Gauthier LV, Nichols-Larsen DS, Uswatte G, Strahl N, Simeo M, Proffitt R et al. Video game rehabilitation for outpatient stroke (VIGoROUS): A multi-site randomized controlled trial of in-home, self-managed, upper-extremity therapy. EClinicalMedicine. 2022; 43:101239

14. Government of Canada. Canadian cost-benefit analysis guide: Regulatory proposals. 2007. Available from: https://www.tbs-sct.canada.ca/rtrap-parfa/analys/analys-eng.pdf

15. Grau-Pellicer M, Lalanza JF, Jovell-Fernandez E, Capdevila L. Impact of mHealth technology on adherence to healthy PA after stroke: a randomized study. Topics in Stroke Rehabilitation. 2020; 27(5):354-368

16. Huijgen BCH, Vollenbroek-Hutten MMR, Zampolini M, Opisso E, Bernabeu M, Van Nieuwenhoven J et al. Feasibility of a home-based telerehabilitation system compared to usual care: arm/hand function in patients with stroke, traumatic brain injury and multiple sclerosis. Journal of Telemedicine and Telecare. 2008; 14(5):249-256

17. Jones K, Burns A. Unit costs of health and social care 2021. Canterbury. Personal Social Services Research Unit University of Kent, 2021. Available from: https://www.pssru.ac.uk/project-pages/unit-costs/unit-costs-of-health-and-social-care-2021/

18. Jonsdottir J, Baglio F, Gindri P, Isernia S, Castiglioni C, Gramigna C et al. Virtual Reality for Motor and Cognitive Rehabilitation From Clinic to Home: A Pilot Feasibility and Efficacy Study for Persons With Chronic Stroke. Frontiers in Neurology. 2021; 12:601131

19. Kirkness CJ, Cain KC, Becker KJ, Tirschwell DL, Buzaitis AM, Weisman PL et al. Randomized trial of telephone versus in-person delivery of a brief psychosocial intervention in post-stroke depression. BMC Research Notes. 2017; 10(1):500

20. Laver KE, Adey-Wakeling Z, Crotty M, Lannin NA, George S, Sherrington C. Telerehabilitation services for stroke. Cochrane Database of Systematic Reviews 2020, Issue DOI: 10.1002/14651858.cd010255.pub3.

21. Lee SJ, Lee EC, Kim M, Ko S-H, Huh S, Choi W et al. Feasibility of dance therapy using telerehabilitation on trunk control and balance training in patients with stroke: A pilot study. Medicine. 2022; 101(35):e30286

22. Lin K-H, Chen C-H, Chen Y-Y, Huang W-T, Lai J-S, Yu S-M et al. Bidirectional and multi-user telerehabilitation system: clinical effect on balance, functional activity, and satisfaction in patients with chronic stroke living in long-term care facilities. Sensors (Basel, Switzerland). 2014; 14(7):12451-12466

23. Llorens R, Noe E, Colomer C, Alcaniz M. Effectiveness, usability, and cost-benefit of a virtual reality-based telerehabilitation program for balance recovery after stroke: a randomized controlled trial. Archives of Physical Medicine and Rehabilitation. 2015; 96(3):418-425 e412

24. Maresca G, Maggio MG, Latella D, Cannavo A, De Cola MC, Portaro S et al. Toward Improving Poststroke Aphasia: A Pilot Study on the Growing Use of Telerehabilitation for the Continuity of Care. Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association. 2019; 28(10):104303

25. Meltzer JA, Baird AJ, Steele RD, Harvey SJ. Computer-based treatment of poststroke language disorders: a non-inferiority study of telerehabilitation compared to in-person service delivery. Aphasiology. 2018; 32(3):290-311

26. National Institute for Health and Care Excellence. Chronic pain (primary and secondary) in over 16s: assessment of all chronic pain and management of chronic primary pain [NG193]. London. 2021. Available from: https://www.nice.org.uk/guidance/ng193

27. National Institute for Health and Care Excellence. Developing NICE guidelines: the manual [updated January 2022]. London. National Institute for Health and Care Excellence, 2014. Available from: https://www.nice.org.uk/process/pmg20

28. Ora HP, Kirmess M, Brady MC, Partee I, Hognestad RB, Johannessen BB et al. The effect of augmented speech-language therapy delivered by telerehabilitation on poststroke aphasia-a pilot randomized controlled trial. Clinical Rehabilitation. 2020; 34(3):369-381

29. Organisation for Economic Co-operation and Development (OECD). Purchasing power parities (PPP). 2012. Available from: http://www.oecd.org/std/ppp Last accessed: 01/02/2023.

30. Piron L, Turolla A, Agostini M, Zucconi C, Cortese F, Zampolini M et al. Exercises for paretic upper limb after stroke: a combined virtual-reality and telemedicine approach. Journal of Rehabilitation Medicine. 2009; 41(12):1016-1102

31. Piron L, Turolla A, Tonin P, Piccione F, Lain L, Dam M. Satisfaction with care in post-stroke patients undergoing a telerehabilitation programme at home. Journal of Telemedicine and Telecare. 2008; 14(5):257-260

32. Salgueiro C, Urrutia G, Cabanas-Valdes R. Influence of Core-Stability Exercises Guided by a Telerehabilitation App on Trunk Performance, Balance and Gait Performance in Chronic Stroke Survivors: A Preliminary Randomized Controlled Trial. International Journal of Environmental Research and Public Health. 2022; 19(9)

33. Salgueiro C, Urrutia G, Cabanas-Valdes R. Telerehabilitation for balance rehabilitation in the subacute stage of stroke: A pilot controlled trial. NeuroRehabilitation. 2022; 51(1):91-99

34. Saywell NL, Vandal AC, Mudge S, Hale L, Brown P, Feigin V et al. Telerehabilitation After Stroke Using Readily Available Technology: A Randomized Controlled Trial. Neurorehabilitation and Neural Repair. 2021; 35(1):88-97

35. Smith GC, Egbert N, Dellman-Jenkins M, Nanna K, Palmieri PA. Reducing depression in stroke survivors and their informal caregivers: a randomized clinical trial of a Web-based intervention. Rehabilitation Psychology. 2012; 57(3):196-206

36. Uswatte G, Taub E, Lum P, Brennan D, Barman J, Bowman MH et al. Tele-rehabilitation of upper-extremity hemiparesis after stroke: Proof-of-concept randomized controlled trial of in-home Constraint-Induced Movement therapy. Restorative Neurology and Neuroscience. 2021; 39(4):303-318

37. Veras M, Stewart J, Deonandan R, Tatmatsu-Rocha J, Higgins J, Poissant L et al. Cost Analysis of a Home-Based Virtual Reality Rehabilitation to Improve Upper Limb Function in Stroke Survivors. Global Journal of Health Science. 2020; 12:98

38. Wu Z, Xu J, Yue C, Li Y, Liang Y. Collaborative Care Model Based Telerehabilitation Exercise Training Program for Acute Stroke Patients in China: A Randomized Controlled Trial. Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association. 2020; 29(12):105328

39. Zhou Q, Lu X, Zhang Y, Sun Z, Li J, Zhu Z. Telerehabilitation Combined Speech-Language and Cognitive Training Effectively Promoted Recovery in Aphasia Patients. Frontiers in Psychology. 2018; 9:2312

Appendices

Appendix A Review protocols

A.1 Review protocol for the clinical and cost effectiveness of telerehabilitation

ID	Field	Content
0.	PROSPERO registration number	CRD42022364501
1.	Review title	In people after stroke, what is the clinical and cost effectiveness of telerehabilitation compared with standard rehabilitation and as an adjunct to standard rehabilitation?
2.	Review question	3.3 In people after stroke, what is the clinical and cost effectiveness of telerehabilitation compared with standard rehabilitation and as an adjunct to standard rehabilitation?
3.	Objective	To assess the clinical and cost-effectiveness of telerehabilitation for people after stroke.
4.	Searches	Key paper: Laver, KE et al. (2020). Telerehabilitation services for stroke. Cochrane Database of Systematic Reviews. 1. DOI: 10.1002/14651858.CD010255.pub3. Final search date: June 2019 The following databases (from inception) will be searched: • Cochrane Central Register of Controlled Trials (CENTRAL) • Cochrane Database of Systematic Reviews (CDSR) • Embase • MEDLINE • Epistemonikas • CINAHL • AMED Searches will be restricted by: • English language studies • Human studies Other searches: • Inclusion lists of systematic reviews

		The searches may be re-run 6 weeks before the final committee meeting and further studies retrieved for inclusion if relevant. The full search strategies will be published in the final review. Medline search strategy to be quality assured using the PRESS evidence-based checklist (see methods chapter for full details).
5.	Condition or domain being studied	Adults and young people (16 or older) after a stroke
6.	Population	Inclusion: • Adults (age ≥16 years) who have had a first or recurrent stroke Exclusion: • Children (age <16 years) • People who had a transient ischaemic attack
7.	Intervention	• Telerehabilitation (the delivery of rehabilitation services via information and communication technologies. Clinically this includes rehabilitation services that include, intervention, supervision, education, consultation and counselling. • Combination of telerehabilitation and in person rehabilitation
8.	Comparator	• In person rehabilitation only • Usual care
9.	Types of study to be included	• Systematic reviews of randomised controlled trials • Randomised controlled trials • Crossover studies (for people after chronic stroke only) If no randomised controlled trial data are available, non-randomised data will be considered. 3. Prospective and retrospective cohort studies 4. Case control studies (if no other evidence identified) Published NMAs and IPDs will be considered for inclusion.
10.	Other exclusion criteria	• Non-English language studies.

		• Crossover RCTs (for people with acute/subacute stroke) • Non comparative cohort studies • Before and after studies • Conference abstracts will be excluded as it is expected there will be sufficient full text published studies available.
11.	Context	People after a stroke. This may include people in an acute (<7 days), subacute (7 days – 6 months) or chronic (>6 months) time horizon.

12.	Primary outcomes (critical outcomes)	All outcomes are considered equally important for decision making and therefore have all been rated as critical:
		At the following time periods:
		• <6 months
		• ≥6 months
		If multiple outcomes are reported before or after these time periods then the latest time period that is ≤6 months or >6 months will be extracted and used in the analysis.
		
		• Person/participant generic health-related quality of life (continuous outcomes will be prioritised [validated measures])
		  ○ EQ-5D
		  ○ SF-6D
		  ○ SF-36
		  ○ SF-12
		  ○ Other measures (AQOL, HUI, 15D, QWB)
		• Carer generic health-related quality of life (continuous outcomes will be prioritised [validated measures])
		  ○ EQ-5D
		  ○ SF-6D
		  ○ SF-36
		  ○ SF-12
		  ○ Other utility measures (AQOL, HUI, 15D, QWB)
		• Activities of daily living (continuous outcomes will be prioritised)
		  ○ Barthel Index
		  ○ National Institutes of Health Stroke Scale
		  ○ Orpington Prognostic Scale
		  ○ Canadian Occupational Performance Measure
		  ○ Extended activities of daily living
		• Mobility
		  ○ Timed Up and Go test
		  ○ Walking speed
		  ○ Functional ambulation category

		• Balance
		  ○ Berg Balance Scale
		• Psychological distress - Depression (continuous outcomes will be prioritised)
		  ○ Hospital Anxiety and Depression scale - depression subscales
		  ○ Patient Health Questionnaire (PHQ-9)
		• Physical function – upper limb (continuous outcomes will be prioritised)
		  ○ Action Research Arm Test
		  ○ Fugl-Meyer assessment
		  ○ Wolf Motor Function Test
		  ○ Modified Ashworth Scale
		  ○ Rivermead motor Assessment Scale
		  ○ Muscle Power Assessment (MRC scale)
		  ○ Berg Balance Scale
		  ○ Box and blocks test
		  ○ 9 hole peg test
		  ○ Motor Activity Log
		  ○ Functional Independence Measure – Motor subscale
		  ○ Motricity Index scale
		  ○ Motor Assessment Scale
		• Stroke-specific measures of cognition (continuous outcomes prioritised)
		  ○ Non-spatial attention and working memory
		  – Attention Rating and Monitoring Scale
		  – Cognitive Failures Questionnaire
		  – Any other subjective measures (for example: Rating Scale of Attentional Behaviour, Moss Attention Rating Scale)
		  – Objective measures (including: Integrated Visual Auditory Continuous Performance Test-Scale Attention Quotient, Trail Making A and B, The Paced Auditory Serial Attention Test, Colour Word Interference Test/Stroop Test, Wechsler Adult Intelligence Scales, Digit Span subtest, Arithmetic subtest, Letter-Number sequencing subtest, Wechsler spatial span subtest, The California Verbal Learning Test, Cancellation tests, other objective measures)
		  ○ Spatial attention
		  – Catherine Bergego Scale
		  – Behavioural inattention test
		  – Kessler Foundation Neglect Assessment Process
		  – Everyday Neglect Questionnaire
		  – Any other subjective measures

		– Objective measures (including: target cancellation, line bisection, the behavioural summary score from the Behavioural Inattention Test, other objective measures) o Memory – Everyday Memory Questionnaire – Any other subjective measures (for example: Memory Assessment Clinics Questionnaire, Internal and External Memory Aids Questionnaires) – Objective measures (including Rivermead Behavioural Memory Test, Wechsler Memory Scale, Cambridge Test for Prospective Memory, Doors and People Memory test, other objective measures) o Executive functions – Dysexecutive Questionnaire/Dysexecutive Questionnaire-revised version (DEX/DEX-R) – Any other subjective measures – Objective measures (including Hayling Test, Brixton Test, Tower of Hanoi/London, Wisconsin Card Sorting Test, Subtests of the Behavioural Assessment of Dysexecutive Syndrome, other objective measures) • Swallow function and ability (continuous outcome) o Functional Oral Intake Scale o Dysphagia Severity Rating Scale o Eating Assessment Tool o Mann Assessment of Swallow Ability o Standardised Swallowing Assessment • Functional communication (continuous outcomes will be prioritised) o Aachen Aphasia Test, spoken communication domain score o Amsterdam-Nijmegen Everyday Language Test (ANELT) o Therapy Outcome Measures (TOMs) aphasia activity scale • Stroke-specific Patient-Reported Outcome Measures (continuous outcomes will be prioritised) o Stroke-Specific Quality of Life (SS-QOL) o Stroke Impact Scale (SIS) o Stroke-specific Sickness Impact Profile (SA-SIP30) o Satisfaction with International Classification of Functioning, Disability and Health – Stroke (SATIS-Stroke) o Neuro-QOL

		○ PROMIS-10 • Withdrawal due to adverse events
14.	Data extraction (selection and coding)	EndNote will be used for reference management, sifting, citations and bibliographies. All references identified by the searches and from other sources will be screened for inclusion. All references identified by the searches and from other sources will be uploaded into EPPI reviewer and de-duplicated. 10% of the abstracts will be reviewed by two reviewers, with any disagreements resolved by discussion or, if necessary, a third independent reviewer. The full text of potentially eligible studies will be retrieved and will be assessed in line with the criteria outlined above. A standardised form will be used to extract data from studies (see Developing NICE guidelines: the manual section 6.4). 10% of all evidence reviews are quality assured by a senior research fellow. This includes checking: • papers were included /excluded appropriately • a sample of the data extractions • correct methods are used to synthesise data • a sample of the risk of bias assessments Disagreements between the review authors over the risk of bias in particular studies will be resolved by discussion, with involvement of a third review author where necessary.
15.	Risk of bias (quality) assessment	Risk of bias will be assessed using the appropriate checklist as described in Developing NICE guidelines: the manual. • Systematic reviews: Risk of Bias in Systematic Reviews (ROBIS) • Randomised Controlled Trial: Cochrane RoB (2.0) • Non randomised study, including cohort studies: Cochrane ROBINS-I • Case control study: CASP case control checklist
16.	Strategy for data synthesis	• Pairwise meta-analyses will be performed using Cochrane Review Manager (RevMan5). Fixed-effects (Mantel-Haenszel) techniques will be used to calculate risk ratios for the binary outcomes where possible. Continuous outcomes will be

		analysed using an inverse variance method for pooling weighted mean differences. Heterogeneity between the studies in effect measures will be assessed using the I^2 statistic and visually inspected. An I^2 value greater than 50% will be considered indicative of substantial heterogeneity. Sensitivity analyses will be conducted based on pre-specified subgroups using stratified meta-analysis to explore the heterogeneity in effect estimates. If this does not explain the heterogeneity, the results will be presented pooled using random-effects. • GRADEpro will be used to assess the quality of evidence for each outcome, taking into account individual study quality and the meta-analysis results. The 4 main quality elements (risk of bias, indirectness, inconsistency and imprecision) will be appraised for each outcome. Publication bias is tested for when there are more than 5 studies for an outcome. The risk of bias across all available evidence was evaluated for each outcome using an adaptation of the 'Grading of Recommendations Assessment, Development and Evaluation (GRADE) toolbox' developed by the international GRADE working group http://www.gradeworkinggroup.org/ • Where meta-analysis is not possible, data will be presented and quality assessed individually per outcome. • WinBUGS will be used for network meta-analysis, if possible given the data identified.
17.	Analysis of sub-groups	Subgroups that will be investigated if heterogeneity is present: Time after stroke at the start of the trial • Hyperacute <72 hours • Acute 72 hours – 7 days • Subacute 7 days – 6 months • Chronic >6 months Severity (as stated by category or as measured by NIHSS scale): • Mild (or NIHSS 1-5) • Moderate (or NIHSS 5-14) • Severe (or NIHSS 15-24) • Very severe (or NIHSS >25) Minutes/hours of intervention per day: • ≤45 minutes • >45 minutes to 1 hour • >1-2 hours

		• >2-4 hours • >4 hours Number of days of treatment per week: • <5 days a week • 5 days a week • 6 days a week • 7 days a week Focus of care: • Upper limb • Lower limb • Swallow • Cognition • Communication • Mood • Pain • Fatigue • Functional independency (Return to work, return to driving ect.) • Mixed (including multidisciplinary packages of care) Mode of delivery: • Telephone • Videoconferencing • Virtual reality Mode of feedback: • Real time communication • 'Store and forward	
18.	Type and method of review	☒	Intervention
		☐	Diagnostic
		☐	Prognostic
		☐	Qualitative
		☐	Epidemiologic
		☐	Service Delivery
		☐	Other (please specify)
19.	Language	English	
20.	Country	England	
21.	Anticipated or actual start date	24/02/2021	

<table>
<tr><td>22.</td><td>Anticipated completion date</td><td colspan="3">14/12/2022</td></tr>
<tr><td rowspan="8">23.</td><td rowspan="8">Stage of review at time of this submission</td><td>Review stage</td><td>Started</td><td>Completed</td></tr>
<tr><td>Preliminary searches</td><td>☐</td><td>☐</td></tr>
<tr><td>Piloting of the study selection process</td><td>☐</td><td>☐</td></tr>
<tr><td>Formal screening of search results against eligibility criteria</td><td>☐</td><td>☐</td></tr>
<tr><td>Data extraction</td><td>☐</td><td>☐</td></tr>
<tr><td>Risk of bias (quality) assessment</td><td>☐</td><td>☐</td></tr>
<tr><td>Data analysis</td><td>☐</td><td>☐</td></tr>
<tr><td>24.</td><td>Named contact</td><td colspan="3">5a. Named contact
National Guideline Centre

5b Named contact e-mail
StrokeRehabUpdate@nice.nhs.uk

5e Organisational affiliation of the review
National Institute for Health and Care Excellence (NICE) and National Guideline Centre</td></tr>
<tr><td>25.</td><td>Review team members</td><td colspan="3">From the National Guideline Centre:
Bernard Higgins (Guideline lead)
George Wood (Senior systematic reviewer)
Madelaine Zucker (Systematic reviewer)
Kate Lovibond (Health economics lead)
Claire Sloan (Health economist)
Joseph Runicles (Information specialist)
Nancy Pursey (Senior project manager)</td></tr>
<tr><td>26.</td><td>Funding sources/sponsor</td><td colspan="3">This systematic review is being completed by the National Guideline Centre which receives funding from NICE.</td></tr>
<tr><td>27.</td><td>Conflicts of interest</td><td colspan="3">All guideline committee members and anyone who has direct input into NICE guidelines (including the evidence review team and expert witnesses) must declare any potential conflicts of interest in line with NICE's code of practice for declaring and dealing with conflicts of interest. Any relevant interests, or changes to interests, will also be declared publicly at the start of each guideline committee meeting. Before each meeting, any potential conflicts of interest will be considered by the guideline</td></tr>
</table>

		committee Chair and a senior member of the development team. Any decisions to exclude a person from all or part of a meeting will be documented. Any changes to a member's declaration of interests will be recorded in the minutes of the meeting. Declarations of interests will be published with the final guideline.	
28.	Collaborators	Development of this systematic review will be overseen by an advisory committee who will use the review to inform the development of evidence-based recommendations in line with section 3 of Developing NICE guidelines: the manual. Members of the guideline committee are available on the NICE website: https://www.nice.org.uk/guidance/indevelopment/gid-ng10175	
29.	Other registration details	N/A	
30.	Reference/URL for published protocol	N/A	
31.	Dissemination plans	NICE may use a range of different methods to raise awareness of the guideline. These include standard approaches such as: • notifying registered stakeholders of publication • publicising the guideline through NICE's newsletter and alerts • issuing a press release or briefing as appropriate, posting news articles on the NICE website, using social media channels, and publicising the guideline within NICE.	
32.	Keywords	Adults; Intervention; Outpatient; Rehabilitation; Self care; Self management; Stroke	
33.	Details of existing review of same topic by same authors	N/A	
34.	Current review status	☐	Ongoing
		☐	Completed but not published
		☒	Completed and published
		☐	Completed, published and being updated
		☐	Discontinued
35..	Additional information	N/A	
36.	Details of final publication	www.nice.org.uk	

A.2 Health economic review protocol

Review question	All questions – health economic evidence
Objectives	To identify health economic studies relevant to any of the review questions.
Search criteria	• Populations, interventions and comparators must be as specified in the clinical review protocol above. • Studies must be of a relevant health economic study design (cost–utility analysis, cost-effectiveness analysis, cost–benefit analysis, cost–consequences analysis, comparative cost analysis). • Studies must not be a letter, editorial or commentary, or a review of health economic evaluations. (Recent reviews will be ordered although not reviewed. The bibliographies will be checked for relevant studies, which will then be ordered.) • Unpublished reports will not be considered unless submitted as part of a call for evidence. • Studies must be in English.
Search strategy	A health economic study search will be undertaken using population-specific terms and a health economic study filter – see appendix B below. Databases searched: • Centre for Reviews and Dissemination NHS Economic Evaluations Database (NHS EED) – all years (closed to new records April 2015) • Centre for Reviews and Dissemination Health Technology Assessment database – all years (closed to new records March 2018) • International HTA database (INAHTA) – all years • Medline and Embase – from 2014 (due to NHS EED closure)
Review strategy	Studies not meeting any of the search criteria above will be excluded. Studies published before 2006 (including those included in the previous guideline), abstract-only studies and studies from non-OECD countries or the USA will also be excluded. Each remaining study will be assessed for applicability and methodological limitations using the NICE economic evaluation checklist which can be found in appendix H of Developing NICE guidelines: the manual (2014).[27] Studies published in 2006 or later that were included in the previous guideline will be reassessed for inclusion and may be included or selectively excluded based on their relevance to the questions covered in this update and whether more applicable evidence is also identified. **Inclusion and exclusion criteria** • If a study is rated as both 'Directly applicable' and with 'Minor limitations' then it will be included in the guideline. A health economic evidence table will be completed and it will be included in the health economic evidence profile. • If a study is rated as either 'Not applicable' or with 'Very serious limitations' then it will usually be excluded from the guideline. If it is excluded then a health economic evidence table will not be completed and it will not be included in the health economic evidence profile. • If a study is rated as 'Partially applicable', with 'Potentially serious limitations' or both then there is discretion over whether it should be included. **Where there is discretion** The health economist will make a decision based on the relative applicability and quality of the available evidence for that question, in discussion with the guideline committee if required. The ultimate aim is to include health economic studies that are helpful for decision-making in the context of the guideline and the current NHS setting. If several studies are considered of sufficiently high applicability and

	methodological quality that they could all be included, then the health economist, in discussion with the committee if required, may decide to include only the most applicable studies and to selectively exclude the remaining studies. All studies excluded on the basis of applicability or methodological limitations will be listed with explanation in the excluded health economic studies appendix below. The health economist will be guided by the following hierarchies. *Setting:* • UK NHS (most applicable). • OECD countries with predominantly public health insurance systems (for example, France, Germany, Sweden). • OECD countries with predominantly private health insurance systems (for example, Switzerland). • Studies set in non-OECD countries or in the USA will be excluded before being assessed for applicability and methodological limitations. *Health economic study type:* • Cost–utility analysis (most applicable). • Other type of full economic evaluation (cost–benefit analysis, cost-effectiveness analysis, cost–consequences analysis). • Comparative cost analysis. • Non-comparative cost analyses including cost-of-illness studies will be excluded before being assessed for applicability and methodological limitations. *Year of analysis:* • The more recent the study, the more applicable it will be. • Studies published in 2006 or later (including any such studies included in the previous guideline) but that depend on unit costs and resource data entirely or predominantly from before 2006 will be rated as 'Not applicable'. • Studies published before 2006 (including any such studies included in the previous guideline) will be excluded before being assessed for applicability and methodological limitations. *Quality and relevance of effectiveness data used in the health economic analysis:* • The more closely the clinical effectiveness data used in the health economic analysis match with the outcomes of the studies included in the clinical review the more useful the analysis will be for decision-making in the guideline.

Appendix B Literature search strategies

B.1 Clinical search literature search strategy

Searches were constructed using a PICO framework where population (P) terms were combined with Intervention (I) and in some cases Comparison (C) terms. Outcomes (O) are rarely used in search strategies as these concepts may not be indexed or described in the title or abstract and are therefore difficult to retrieve. Search filters were applied to the search where appropriate.

Table 10: Database parameters, filters and limits applied

Database	Dates searched	Search filter used
Medline (OVID)	1946 – 08 January 2023	Randomised controlled trials Systematic review studies Observational studies Exclusions (animal studies, letters, comments, editorials, case studies/reports) English language
Embase (OVID)	1974 – 08 January 2023	Randomised controlled trials Systematic review studies Observational studies Exclusions (animal studies, letters, comments, editorials, case studies/reports, conference abstracts) English language
The Cochrane Library (Wiley)	Cochrane Reviews to 2023 Issue 1 of 12 CENTRAL to 2023 Issue 1 of 12	Exclusions (clinical trials, conference abstracts)
Epistemonikos (The Epistemonikos Foundation)	Inception – 08 January 2023	Exclusions (Cochrane reviews) English language
AMED, Allied and Complementary Medicine (OVID)	Inception – 08 January 2023	Exclusions (animal studies, letters, comments, case reports) English language
Current Nursing and Allied Health Literature - CINAHL (EBSCO)	Inception – 08 January 2023	Human Exclusions (Medline records) English Language

Medline (Ovid) search terms

1.	exp Stroke/
2.	Stroke Rehabilitation/
3.	exp Cerebral Hemorrhage/
4.	(stroke or strokes or cva or poststroke* or apoplexy or "cerebrovascular accident").ti,ab.
5.	((cerebro* or brain or brainstem or cerebral*) adj3 (infarct* or accident*)).ti,ab.
6.	"brain attack*".ti,ab.
7.	or/1-6
8.	letter/
9.	editorial/
10.	news/
11.	exp historical article/
12.	Anecdotes as Topic/
13.	comment/
14.	case report/
15.	(letter or comment*).ti.
16.	or/8-15
17.	randomized controlled trial/ or random*.ti,ab.
18.	16 not 17
19.	animals/ not humans/
20.	exp Animals, Laboratory/
21.	exp Animal Experimentation/
22.	exp Models, Animal/
23.	exp Rodentia/
24.	(rat or rats or mouse or mice or rodent*).ti.
25.	or/18-24
26.	7 not 25
27.	limit 26 to English language
28.	telemedicine/ or telemetry/ or telerehabilitation/ or exp videoconferencing/ or telecommunications/ or computer communication networks/ or remote consultation/ or exp telephone/ or electronic mail/ or exp internet/ or computer-assisted instruction/ or exp computers, handheld/ or social networking/ or text messaging/ or computer/ or exp microcomputer/ or minicomputer/ or mobile application/
29.	(telemetr* or telerehab* or tele rehab* or telehealth* or tele health* or ehealth or e health or telemed* or tele med* or telehomecare or tele homecare or telecoach* or tele coach* or telecommunication* or tele communication* or videoconferenc* or video conferenc* or videoconsultation* or video consultation* or telestroke or tele stroke or teleconferenc* or tele conferenc* or teleconsultati* or tele consultati* or telecare or tele care or telecaring or tele caring or teleeducation* or tele education* or teleneurorehab* or tele neurorehab* or telemonitor* or tele monitor*).ti,ab,kf.
30.	(telespeech or tele speech or teleOT or tele OT or telepractic* or tele practic* or teletherap* or tele therap* or tele supervis* or telesupervis* or telementor* or tele mentor*).ti,ab,kf.
31.	((remote* or distance* or distant) adj4 (rehab* or therap* or treatment* or physio* or communicat* or consultation* or care or caring or specialist* or consultant* or monitor* or technolog* or counsel*)).ti,ab,kf.
32.	((web* or internet* or virtual* or remote* or wireless* or mobile or video* or computer* or online or on line or digital*) adj4 (rehab* or therap* or treatment* or physio* or

	communicat* or consultation* or care or caring or specialist* or consultant* or monitor* or technolog* or counsel*)).ti,ab,kf.
33.	((web* or internet* or virtual* or remote* or wireless* or mobile* or video* or computer* or online or on line or comput* or device* or app or apps or phone* or elearn* or e learn* or email* or e mail* or facetime or face time or forum* or ipad* or iphone* or android or palm pilot* or personal digital assistant* or skype* or smartphone* or smart phone* or cellphone* or cell phone* or social media or social network* or sms or text messag* or twitter or tweet* or wiki* or youtube* or zoom or microsoft teams or photo* or telephone* or tiktok) adj4 (rehab* or therap* or treatment* or communication* or consult* or care or specialist* or monitor* or educat* or counsel* or train* or asses* or educat* or decision making)).ti,ab,kf.
34.	(mhealth or m health or mobile health or erehab* or e rehab*).ti,ab,kf.
35.	or/28-34
36.	27 and 35
37.	Epidemiologic studies/
38.	Observational study/
39.	exp Cohort studies/
40.	(cohort adj (study or studies or analys* or data)).ti,ab.
41.	((follow up or observational or uncontrolled or non randomi#ed or epidemiologic*) adj (study or studies or data)).ti,ab.
42.	((longitudinal or retrospective or prospective or cross sectional) and (study or studies or review or analys* or cohort* or data)).ti,ab.
43.	Controlled Before-After Studies/
44.	Historically Controlled Study/
45.	Interrupted Time Series Analysis/
46.	(before adj2 after adj2 (study or studies or data)).ti,ab.
47.	exp case control studies/
48.	case control*.ti,ab.
49.	Cross-sectional studies/
50.	(cross sectional and (study or studies or review or analys* or cohort* or data)).ti,ab.
51.	or/37-50
52.	randomized controlled trial.pt.
53.	controlled clinical trial.pt.
54.	randomi#ed.ti,ab.
55.	placebo.ab.
56.	randomly.ti,ab.
57.	Clinical Trials as topic.sh.
58.	trial.ti.
59.	or/52-58
60.	Meta-Analysis/
61.	exp Meta-Analysis as Topic/
62.	(meta analy* or metanaly* or metaanaly* or meta regression).ti,ab.
63.	((systematic* or evidence*) adj3 (review* or overview*)).ti,ab.
64.	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab.
65.	(search strategy or search criteria or systematic search or study selection or data extraction).ab.
66.	(search* adj4 literature).ab.

67.	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab.
68.	cochrane.jw.
69.	((multiple treatment* or indirect or mixed) adj2 comparison*).ti,ab.
70.	or/60-69
71.	36 and (51 or 59 or 70)

Embase (Ovid) search terms

1.	exp Cerebrovascular accident/
2.	exp Brain infarction/
3.	Stroke Rehabilitation/
4.	(stroke or strokes or cva or poststroke* or apoplexy or "cerebrovascular accident").ti,ab.
5.	((cerebro* or brain or brainstem or cerebral*) adj3 (infarct* or accident*)).ti,ab.
6.	"brain attack*".ti,ab.
7.	Intracerebral hemorrhage/
8.	or/1-7
9.	letter.pt. or letter/
10.	note.pt.
11.	editorial.pt.
12.	case report/ or case study/
13.	(letter or comment*).ti.
14.	(conference abstract or conference paper).pt.
15.	or/9-14
16.	randomized controlled trial/ or random*.ti,ab.
17.	15 not 16
18.	animal/ not human/
19.	nonhuman/
20.	exp Animal Experiment/
21.	exp Experimental Animal/
22.	animal model/
23.	exp Rodent/
24.	(rat or rats or mouse or mice).ti.
25.	or/17-24
26.	8 not 25
27.	limit 26 to English language
28.	*telehealth/ or *telemedicine/ or *telenursing/ or exp *telemetry/ or *telephone/ or *telecommunication/ or *teleconsultation/ or *telephone interview/ or *videoconferencing/ or *videorecording/ or *e mail/ or *text messaging/ or *internet/ or *wireless communication/ or *mobile application/ or exp *mobile phone/ or *tablet/ or *computer/ or *computer system/ or *microcomputer/ or *minicomputer/ or *personal computer/ or *personal digital assistant/ or *telerehabilitation/ or *text messaging/ or *social network/
29.	(telemetr* or telerehab* or tele rehab* or telehealth* or tele health* or ehealth or e health or telemed* or tele med* or telehomecare or tele homecare or telecoach* or tele coach* or telecommunication* or tele communication* or videoconferenc* or video conferenc* or videoconsultation* or video consultation* or telestroke or tele stroke or teleconferenc* or tele conferenc* or teleconsultati* or tele consultati* or telecare or tele

	care or telecaring or tele caring or teleeducation* or tele education* or teleneurorehab* or tele neurorehab* or telemonitor* or tele monitor*).ti,ab,kf.
30.	(telespeech or tele speech or teleOT or tele OT or telepractic* or tele practic* or teletherap* or tele therap* or tele supervis* or telesupervis* or telementor* or tele mentor*).ti,ab,kf.
31.	((remote* or distance* or distant) adj4 (rehab* or therap* or treatment* or physio* or communicat* or consultation* or care or caring or specialist* or consultant* or monitor* or technolog* or counsel*)).ti,ab,kf.
32.	((web* or internet* or virtual* or remote* or wireless* or mobile or video* or computer* or online or on line or digital*) adj4 (rehab* or therap* or treatment* or physio* or communicat* or consultation* or care or caring or specialist* or consultant* or monitor* or technolog* or counsel*)).ti,ab,kf.
33.	((web* or internet* or virtual* or remote* or wireless* or mobile* or video* or computer* or online or on line or comput* or device* or app or apps or phone* or elearn* or e learn* or email* or e mail* or facetime or face time or forum* or ipad* or iphone* or android or palm pilot* or personal digital assistant* or skype* or smartphone* or smart phone* or cellphone* or cell phone* or social media or social network* or sms or text messag* or twitter or tweet* or wiki* or youtube* or zoom or microsoft teams or photo* or telephone* or tiktok) adj4 (rehab* or therap* or treatment* or communication* or consult* or care or specialist* or monitor* or educat* or counsel* or train* or asses* or educat* or decision making)).ti,ab,kf.
34.	(mhealth or m health or mobile health or erehab* or e rehab*).ti,ab,kf.
35.	or/28-34
36.	27 and 35
37.	Clinical study/
38.	Observational study/
39.	family study/
40.	longitudinal study/
41.	retrospective study/
42.	prospective study/
43.	cohort analysis/
44.	follow-up/
45.	cohort*.ti,ab.
46.	44 and 45
47.	(cohort adj (study or studies or analys* or data)).ti,ab.
48.	((follow up or observational or uncontrolled or non randomi#ed or epidemiologic*) adj (study or studies or data)).ti,ab.
49.	((longitudinal or retrospective or prospective or cross sectional) and (study or studies or review or analys* or cohort* or data)).ti,ab.
50.	(before adj2 after adj2 (study or studies or data)).ti,ab.
51.	exp case control study/
52.	case control*.ti,ab.
53.	cross-sectional study/
54.	(cross sectional and (study or studies or review or analys* or cohort* or data)).ti,ab.
55.	or/37-43,46-54
56.	random*.ti,ab.
57.	factorial*.ti,ab.
58.	(crossover* or cross over*).ti,ab.
59.	((doubl* or singl*) adj blind*).ti,ab.

60.	(assign* or allocat* or volunteer* or placebo*).ti,ab.
61.	crossover procedure/
62.	single blind procedure/
63.	randomized controlled trial/
64.	double blind procedure/
65.	or/56-64
66.	systematic review/
67.	meta-analysis/
68.	(meta analy* or metanaly* or metaanaly* or meta regression).ti,ab.
69.	((systematic* or evidence*) adj3 (review* or overview*)).ti,ab.
70.	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab.
71.	(search strategy or search criteria or systematic search or study selection or data extraction).ab.
72.	(search* adj4 literature).ab.
73.	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab.
74.	cochrane.jw.
75.	((multiple treatment* or indirect or mixed) adj2 comparison*).ti,ab.
76.	or/66-75
77.	36 and (55 or 65 or 76)

Cochrane Library (Wiley) search terms

#1.	MeSH descriptor: [Stroke] explode all trees
#2.	MeSH descriptor: [Stroke Rehabilitation] explode all trees
#3.	MeSH descriptor: [Cerebral Hemorrhage] explode all trees
#4.	(stroke or strokes or cva or poststroke* or apoplexy or "cerebrovascular accident"):ti,ab
#5.	((cerebro* or brain or brainstem or cerebral*) near/3 (infarct* or accident*)):ti,ab
#6.	brain attack*:ti,ab
#7.	(or #1-#6)
#8.	conference:pt or (clinicaltrials or trialsearch):so
#9.	#7 not #8
#10.	MeSH descriptor: [Telemedicine] explode all trees
#11.	MeSH descriptor: [Telemetry] explode all trees
#12.	MeSH descriptor: [Telerehabilitation] explode all trees
#13.	MeSH descriptor: [Videoconferencing] explode all trees
#14.	MeSH descriptor: [Telecommunications] explode all trees
#15.	MeSH descriptor: [Computer Communication Networks] explode all trees
#16.	MeSH descriptor: [Remote Consultation] explode all trees
#17.	MeSH descriptor: [Telephone] explode all trees
#18.	MeSH descriptor: [Electronic Mail] explode all trees
#19.	MeSH descriptor: [Internet] explode all trees
#20.	MeSH descriptor: [Computer-Assisted Instruction] explode all trees
#21.	MeSH descriptor: [Computers, Handheld] explode all trees
#22.	MeSH descriptor: [Social Networking] explode all trees

#23.	MeSH descriptor: [Text Messaging] explode all trees
#24.	MeSH descriptor: [Computers] explode all trees
#25.	MeSH descriptor: [Microcomputers] explode all trees
#26.	MeSH descriptor: [Mobile Applications] explode all trees
#27.	(telemetr* or telerehab* or tele rehab* or telehealth* or tele health* or ehealth or e health or telemed* or tele med* or telehomecare or tele homecare or telecoach* or tele coach* or telecommunication* or tele communication* or videoconferenc* or video conferenc* or videoconsultation* or video consultation* or telestroke or tele stroke or teleconferenc* or tele conferenc* or teleconsultati* or tele consultati* or telecare or tele care or telecaring or tele caring or teleeducation* or tele education* or teleneurorehab* or tele neurorehab* or telemonitor* or tele monitor*):ti,ab
#28.	(telespeech or tele speech or teleOT or tele OT or telepractic* or tele practic* or teletherap* or tele therap* or tele supervis* or telesupervis* or telementor* or tele mentor*):ti,ab
#29.	((remote* or distance* or distant) near/4 (rehab* or therap* or treatment* or physio* or communicat* or consultation* or care or caring or specialist* or consultant* or monitor* or technolog* or counsel*)):ti,ab
#30.	(mhealth or m health or mobile health or erehab* or e rehab*):ti,ab
#31.	(or #10-#30)
#32.	#9 and #31

CINAHL search terms

S1.	MW Stroke or MH Cerebral Hemorrhage
S2.	stroke* or cva or poststroke* or apoplexy or "cerebrovascular accident"
S3.	(cerebro* OR brain OR brainstem OR cerebral*) AND (infarct* OR accident*)
S4.	"brain attack*"
S5.	S1 or S2 or S3 or S4
S6.	(MM "Telehealth") OR (MM "Telerehabilitation") OR (MM "Telemedicine")
S7.	(MH "Mobile Applications")
S8.	(MM "Videoconferencing")
S9.	(MH "Mobile Applications")
S10.	(MM "Internet")
S11.	(MM "Email")
S12.	(MM "Computers, Hand-Held")
S13.	telemetr* or telerehab* or tele rehab* or telehealth* or tele health* or ehealth or e health or telemed* or tele med* or telehomecare or tele homecare or telecoach* or tele coach* or telecommunication* or tele communication* or videoconferenc* or video conferenc* or videoconsultation* or video consultation* or telestroke or tele stroke or teleconferenc* or tele conferenc* or teleconsultati* or tele consultati* or telecare or tele care or telecaring or tele caring or teleeducation* or tele education
S14.	((web* or internet* or virtual* or remote* or wireless* or mobile or video* or computer* or online or on line or digital*) N2 (rehab* or therap* or treatment* or physio* or communicat* or consultation* or care or caring or specialist* or consultant* or monitor* or technolog* or counsel*))
S15.	mhealth or m health or mobile health or erehab* or e rehab*
S16.	((web* or internet* or virtual* or remote* or wireless* or mobile* or video* or computer* or online or on line or comput* or device* or app or apps or phone* or elearn* or e learn* or email* or e mail* or facetime or face time or forum* or ipad* or iphone* or android or palm pilot* or personal digital assistant* or skype* or smartphone* or smart phone* or cellphone* or cell phone* or social media or social network* or sms or text messag* or twitter or tweet* or wiki* or youtube* or zoom))

S17.	S5 or S7 or S8 or S9 or S10 or S11 or S12 or S13 or S14 or S15 or S16
S18.	S5 and S17

AMED search terms

1.	exp Stroke/
2.	exp Cerebral Hemorrhage/
3.	(stroke or strokes or cva or poststroke* or apoplexy or "cerebrovascular accident").ti,ab.
4.	((cerebro* or brain or brainstem or cerebral*) adj3 (infarct* or accident*)).ti,ab.
5.	"brain attack*".ti,ab.
6.	or/1-5
7.	case report/
8.	(letter or comment*).ti.
9.	or/7-8
10.	randomized controlled trials/ or random*.ti,ab.
11.	9 not 10
12.	animals/ not humans/
13.	(rat or rats or mouse or mice or rodent*).ti.
14.	or/11-13
15.	6 not 14
16.	Telemedicine/ or telecommunications/ or telephone/ or internet/ or computer assisted instruction/ or microcomputers/
17.	(telemetr* or telerehab* or tele rehab* or telehealth* or tele health* or ehealth or e health or telemed* or tele med* or telehomecare or tele homecare or telecoach* or tele coach* or telecommunication* or tele communication* or videoconferenc* or video conferenc* or videoconsultation* or video consultation* or telestroke or tele stroke or teleconferenc* or tele conferenc* or teleconsultati* or tele consultati* or telecare or tele care or telecaring or tele caring or teleeducation* or tele education* or teleneurorehab* or tele neurorehab* or telemonitor* or tele monitor*).ti,ab.
18.	(telespeech or tele speech or teleOT or tele OT or telepractic* or tele practic* or teletherap* or tele therap* or tele supervis* or telesupervis* or telementor* or tele mentor*).ti,ab.
19.	((remote* or distance* or distant) adj4 (rehab* or therap* or treatment* or physio* or communicat* or consultation* or care or caring or specialist* or consultant* or monitor* or technolog* or counsel*)).ti,ab.
20.	((web* or internet* or virtual* or remote* or wireless* or mobile or video* or computer* or online or on line or digital*) adj4 (rehab* or therap* or treatment* or physio* or communicat* or consultation* or care or caring or specialist* or consultant* or monitor* or technolog* or counsel*)).ti,ab.
21.	((web* or internet* or virtual* or remote* or wireless* or mobile* or video* or computer* or online or on line or comput* or device* or app or apps or phone* or elearn* or e learn* or email* or e mail* or facetime or face time or forum* or ipad* or iphone* or android or palm pilot* or personal digital assistant* or skype* or smartphone* or smart phone* or cellphone* or cell phone* or social media or social network* or sms or text messag* or twitter or tweet* or wiki* or youtube* or zoom or microsoft teams or photo* or telephone* or tiktok) adj4 (rehab* or therap* or treatment* or communication* or consult* or care or specialist* or monitor* or educat* or counsel* or train* or asses* or educat* or decision making)).ti,ab.
22.	(mhealth or m health or mobile health or erehab* or e rehab*).ti,ab.
23.	or/16-22
24.	15 and 23

25.	limit 24 to English language

Epistemonikos search terms

1.	(title:((title:(telemetr* OR telerehab* OR tele rehab* OR telehealth* OR tele health* OR ehealth OR e health OR telemed* OR tele med* OR telehomecare OR tele homecare OR telecoach* OR tele coach* OR telecommunication* OR tele communication* OR videoconferenc* OR video conferenc* OR videoconsultation* OR video consultation* OR telestroke OR tele stroke OR teleconferenc* OR tele conferenc* OR teleconsultati* OR tele consultati* OR telecare OR tele care OR telecaring OR tele caring OR teleeducation* OR tele education* OR teleneurorehab* OR tele neurorehab* OR telemonitor* OR tele monitor*) OR abstract:(telemetr* OR telerehab* OR tele rehab* OR telehealth* OR tele health* OR ehealth OR e health OR telemed* OR tele med* OR telehomecare OR tele homecare OR telecoach* OR tele coach* OR telecommunication* OR tele communication* OR videoconferenc* OR video conferenc* OR videoconsultation* OR video consultation* OR telestroke OR tele stroke OR teleconferenc* OR tele conferenc* OR teleconsultati* OR tele consultati* OR telecare OR tele care OR telecaring OR tele caring OR teleeducation* OR tele education* OR teleneurorehab* OR tele neurorehab* OR telemonitor* OR tele monitor*)) OR (title:(telespeech OR tele speech OR teleOT OR tele OT OR telepractic* OR tele practic* OR teletherap* OR tele therap* OR tele supervis* OR telesupervis* OR telementor* OR tele mentor*) OR abstract:(telespeech OR tele speech OR teleOT OR tele OT OR telepractic* OR tele practic* OR teletherap* OR tele therap* OR tele supervis* OR telesupervis* OR telementor* OR tele mentor*))) OR abstract:((title:(telemetr* OR telerehab* OR tele rehab* OR telehealth* OR tele health* OR ehealth OR e health OR telemed* OR tele med* OR telehomecare OR tele homecare OR telecoach* OR tele coach* OR telecommunication* OR tele communication* OR videoconferenc* OR video conferenc* OR videoconsultation* OR video consultation* OR telestroke OR tele stroke OR teleconferenc* OR tele conferenc* OR teleconsultati* OR tele consultati* OR telecare OR tele care OR telecaring OR tele caring OR teleeducation* OR tele education* OR teleneurorehab* OR tele neurorehab* OR telemonitor* OR tele monitor*) OR abstract:(telemetr* OR telerehab* OR tele rehab* OR telehealth* OR tele health* OR ehealth OR e health OR telemed* OR tele med* OR telehomecare OR tele homecare OR telecoach* OR tele coach* OR telecommunication* OR tele communication* OR videoconferenc* OR video conferenc* OR videoconsultation* OR video consultation* OR telestroke OR tele stroke OR teleconferenc* OR tele conferenc* OR teleconsultati* OR tele consultati* OR telecare OR tele care OR telecaring OR tele caring OR teleeducation* OR tele education* OR teleneurorehab* OR tele neurorehab* OR telemonitor* OR tele monitor*)) OR (title:(telespeech OR tele speech OR teleOT OR tele OT OR telepractic* OR tele practic* OR teletherap* OR tele therap* OR tele supervis* OR telesupervis* OR telementor* OR tele mentor*) OR abstract:(telespeech OR tele speech OR teleOT OR tele OT OR telepractic* OR tele practic* OR teletherap* OR tele therap* OR tele supervis* OR telesupervis* OR telementor* OR tele mentor*)))) AND (title:((title:(Stroke OR strokes OR cva OR poststroke* OR apoplexy OR "cerebrovascular accident" OR "brain attack") OR abstract:(Stroke OR strokes OR cva OR poststroke* OR apoplexy OR "cerebrovascular accident" OR "brain attack")) AND (title:((cerebro* OR brain OR brainstem OR cerebral*) AND (infarct* OR accident*)) OR abstract:((cerebro* OR brain OR brainstem OR cerebral*) AND (infarct* OR accident*)))) OR abstract:((title:(Stroke OR strokes OR cva OR poststroke* OR apoplexy OR "cerebrovascular accident" OR "brain attack") OR abstract:(Stroke OR strokes OR cva OR poststroke* OR apoplexy OR "cerebrovascular accident" OR "brain attack")) AND (title:((cerebro* OR brain OR brainstem OR cerebral*) AND (infarct* OR accident*)) OR abstract:((cerebro* OR brain OR brainstem OR cerebral*) AND (infarct* OR accident*)))))

B.2 Health Economics literature search strategy

Health economic evidence was identified by conducting searches using terms for a broad Stroke Rehabilitation population. The following databases were searched: NHS Economic Evaluation Database (NHS EED - this ceased to be updated after 31st March 2015), Health

Technology Assessment database (HTA - this ceased to be updated from 31st March 2018) and The International Network of Agencies for Health Technology Assessment (INAHTA). Searches for recent evidence were run on Medline and Embase from 2014 onwards for health economics, and all years for quality-of-life studies. Additional searches were run in CINAHL and PsycInfo looking for health economic evidence.

Table 2: Database parameters, filters and limits applied

Database	Dates searched	Search filters and limits applied
Medline (OVID)	Health Economics 1 January 2014 – 08 January 2023	Health economics studies Quality of life studies Exclusions (animal studies, letters, comments, editorials, case studies/reports,) English language
	Quality of Life 1946 – 08 January 2023	
Embase (OVID)	Health Economics 1 January 2014 – 08 January 2023	Health economics studies Quality of life studies Exclusions (animal studies, letters, comments, editorials, case studies/reports, conference abstracts) English language
	Quality of Life 1974 – 08 January 2023	
NHS Economic Evaluation Database (NHS EED) (Centre for Research and Dissemination - CRD)	Inception –31st March 2015	
Health Technology Assessment Database (HTA) (Centre for Research and Dissemination – CRD)	Inception – 31st March 2018	
The International Network of Agencies for Health Technology Assessment (INAHTA)	Inception - 08 January 2023	English language
PsycINFO (OVID)	1 January 2014 – 08 January 2023	Health economics studies Exclusions (animal studies, letters, case reports) Human English language
Current Nursing and Allied Health Literature - CINAHL (EBSCO)	1 January 2014 – 08 January 2023	Health economics studies Exclusions (Medline records, animal studies, letters, editorials, comments, theses)

Database	Dates searched	Search filters and limits applied
		Human English language

Medline (Ovid) search terms

1.	exp Stroke/
2.	exp Cerebral Hemorrhage/
3.	(stroke or strokes or cva or poststroke* or apoplexy or "cerebrovascular accident").ti,ab.
4.	((cerebro* or brain or brainstem or cerebral*) adj3 (infarct* or accident*)).ti,ab.
5.	"brain attack*".ti,ab.
6.	or/1-5
7.	letter/
8.	editorial/
9.	news/
10.	exp historical article/
11.	Anecdotes as Topic/
12.	comment/
13.	case report/
14.	(letter or comment*).ti.
15.	or/7-14
16.	randomized controlled trial/ or random*.ti,ab.
17.	15 not 16
18.	animals/ not humans/
19.	exp Animals, Laboratory/
20.	exp Animal Experimentation/
21.	exp Models, Animal/
22.	exp Rodentia/
23.	(rat or rats or mouse or mice or rodent*).ti.
24.	or/17-23
25.	6 not 24
26.	Economics/
27.	Value of life/
28.	exp "Costs and Cost Analysis"/
29.	exp Economics, Hospital/
30.	exp Economics, Medical/
31.	Economics, Nursing/
32.	Economics, Pharmaceutical/
33.	exp "Fees and Charges"/

34.	exp Budgets/
35.	budget*.ti,ab.
36.	cost*.ti.
37.	(economic* or pharmaco?economic*).ti.
38.	(price* or pricing*).ti,ab.
39.	(cost* adj2 (effective* or utilit* or benefit* or minimi* or unit* or estimat* or variable*)).ab.
40.	(financ* or fee or fees).ti,ab.
41.	(value adj2 (money or monetary)).ti,ab.
42.	or/26-41
43.	quality-adjusted life years/
44.	sickness impact profile/
45.	(quality adj2 (wellbeing or well being)).ti,ab.
46.	sickness impact profile.ti,ab.
47.	disability adjusted life.ti,ab.
48.	(qal* or qtime* or qwb* or daly*).ti,ab.
49.	(euroqol* or eq5d* or eq 5*).ti,ab.
50.	(qol* or hql* or hqol* or h qol* or hrqol* or hr qol*).ti,ab.
51.	(health utility* or utility score* or disutilit* or utility value*).ti,ab.
52.	(hui or hui1 or hui2 or hui3).ti,ab.
53.	(health* year* equivalent* or hye or hyes).ti,ab.
54.	discrete choice*.ti,ab.
55.	rosser.ti,ab.
56.	(willingness to pay or time tradeoff or time trade off or tto or standard gamble*).ti,ab.
57.	(sf36* or sf 36* or short form 36* or shortform 36* or shortform36*).ti,ab.
58.	(sf20 or sf 20 or short form 20 or shortform 20 or shortform20).ti,ab.
59.	(sf12* or sf 12* or short form 12* or shortform 12* or shortform12*).ti,ab.
60.	(sf8* or sf 8* or short form 8* or shortform 8* or shortform8*).ti,ab.
61.	(sf6* or sf 6* or short form 6* or shortform 6* or shortform6*).ti,ab.
62.	or/43-61
63.	25 and 42
64.	25 and 62
65.	limit 63 to English language
66.	limit 64 to English language

Embase (Ovid) search terms

1.	exp Cerebrovascular accident/
2.	exp Brain infarction/
3.	(stroke or strokes or cva or poststroke* or apoplexy or "cerebrovascular accident").ti,ab.
4.	((cerebro* or brain or brainstem or cerebral*) adj3 (infarct* or accident*)).ti,ab.

5.	"brain attack*".ti,ab.
6.	Intracerebral hemorrhage/
7.	or/1-6
8.	letter.pt. or letter/
9.	note.pt.
10.	editorial.pt.
11.	case report/ or case study/
12.	(letter or comment*).ti.
13.	or/8-12
14.	randomized controlled trial/ or random*.ti,ab.
15.	13 not 14
16.	animal/ not human/
17.	nonhuman/
18.	exp Animal Experiment/
19.	exp Experimental Animal/
20.	animal model/
21.	exp Rodent/
22.	(rat or rats or mouse or mice).ti.
23.	or/15-22
24.	7 not 23
25.	health economics/
26.	exp economic evaluation/
27.	exp health care cost/
28.	exp fee/
29.	budget/
30.	funding/
31.	budget*.ti,ab.
32.	cost*.ti.
33.	(economic* or pharmaco?economic*).ti.
34.	(price* or pricing*).ti,ab.
35.	(cost* adj2 (effective* or utilit* or benefit* or minimi* or unit* or estimat* or variable*)).ab.
36.	(financ* or fee or fees).ti,ab.
37.	(value adj2 (money or monetary)).ti,ab.
38.	or/25-37
39.	quality adjusted life year/
40.	"quality of life index"/
41.	short form 12/ or short form 20/ or short form 36/ or short form 8/
42.	sickness impact profile/
43.	(quality adj2 (wellbeing or well being)).ti,ab.
44.	sickness impact profile.ti,ab.
45.	disability adjusted life.ti,ab.

46.	(qal* or qtime* or qwb* or daly*).ti,ab.
47.	(euroqol* or eq5d* or eq 5*).ti,ab.
48.	(qol* or hql* or hqol* or h qol* or hrqol* or hr qol*).ti,ab.
49.	(health utility* or utility score* or disutilit* or utility value*).ti,ab.
50.	(hui or hui1 or hui2 or hui3).ti,ab.
51.	(health* year* equivalent* or hye or hyes).ti,ab.
52.	discrete choice*.ti,ab.
53.	rosser.ti,ab.
54.	(willingness to pay or time tradeoff or time trade off or tto or standard gamble*).ti,ab.
55.	(sf36* or sf 36* or short form 36* or shortform 36* or shortform36*).ti,ab.
56.	(sf20 or sf 20 or short form 20 or shortform 20 or shortform20).ti,ab.
57.	(sf12* or sf 12* or short form 12* or shortform 12* or shortform12*).ti,ab.
58.	(sf8* or sf 8* or short form 8* or shortform 8* or shortform8*).ti,ab.
59.	(sf6* or sf 6* or short form 6* or shortform 6* or shortform6*).ti,ab.
60.	or/39-59
61.	limit 24 to English language
62.	38 and 61
63.	60 and 61

NHS EED and HTA (CRD) search terms

#1.	MeSH DESCRIPTOR Stroke EXPLODE ALL TREES
#2.	MeSH DESCRIPTOR Cerebral Hemorrhage EXPLODE ALL TREES
#3.	(stroke* or cva or poststroke* or apoplexy or "cerebrovascular accident")
#4.	(((cerebro* or brain or brainstem or cerebral*) adj3 (infarct* or accident*)))
#5.	("brain attack*")
#6.	#1 OR #2 OR #3 OR #4 OR #5

INAHTA search terms

1.	(brain attack*) OR (((cerebro* or brain or brainstem or cerebral*) and (infarct* or accident*))) OR ((stroke or strokes or cva or poststroke* or apoplexy or "cerebrovascular accident")) OR ("Cerebral Hemorrhage"[mhe]) OR ("Stroke"[mhe])

CINAHL search terms

1.	MH "Economics+"
2.	MH "Financial Management+"
3.	MH "Financial Support+"
4.	MH "Financing, Organized+"
5.	MH "Business+"
6.	S2 OR S3 or S4 OR S5
7.	S1 not S6
8.	MH "Health Resource Allocation"
9.	MH "Health Resource Utilization"
10.	S8 OR S9
11.	S7 OR S10

12.	(cost or costs or economic* or pharmacoeconomic* or price* or pricing*) OR AB (cost or costs or economic* or pharmacoeconomic* or price* or pricing*)
13.	S11 OR S12
14.	PT editorial
15.	PT letter
16.	PT commentary
17.	S14 or S15 or S16
18.	S13 NOT S17
19.	MH "Animal Studies"
20.	(ZT "doctoral dissertation") or (ZT "masters thesis")
21.	S18 NOT (S19 OR S20)
22.	PY 2014-
23.	S21 AND S22
24.	MW Stroke or MH Cerebral Hemorrhage
25.	stroke* or cva or poststroke* or apoplexy or "cerebrovascular accident"
26.	(cerebro* OR brain OR brainstem OR cerebral*) AND (infarct* OR accident*)
27.	"brain attack*"
28.	S24 OR S25 OR S26 OR S27
29.	S23 AND S28

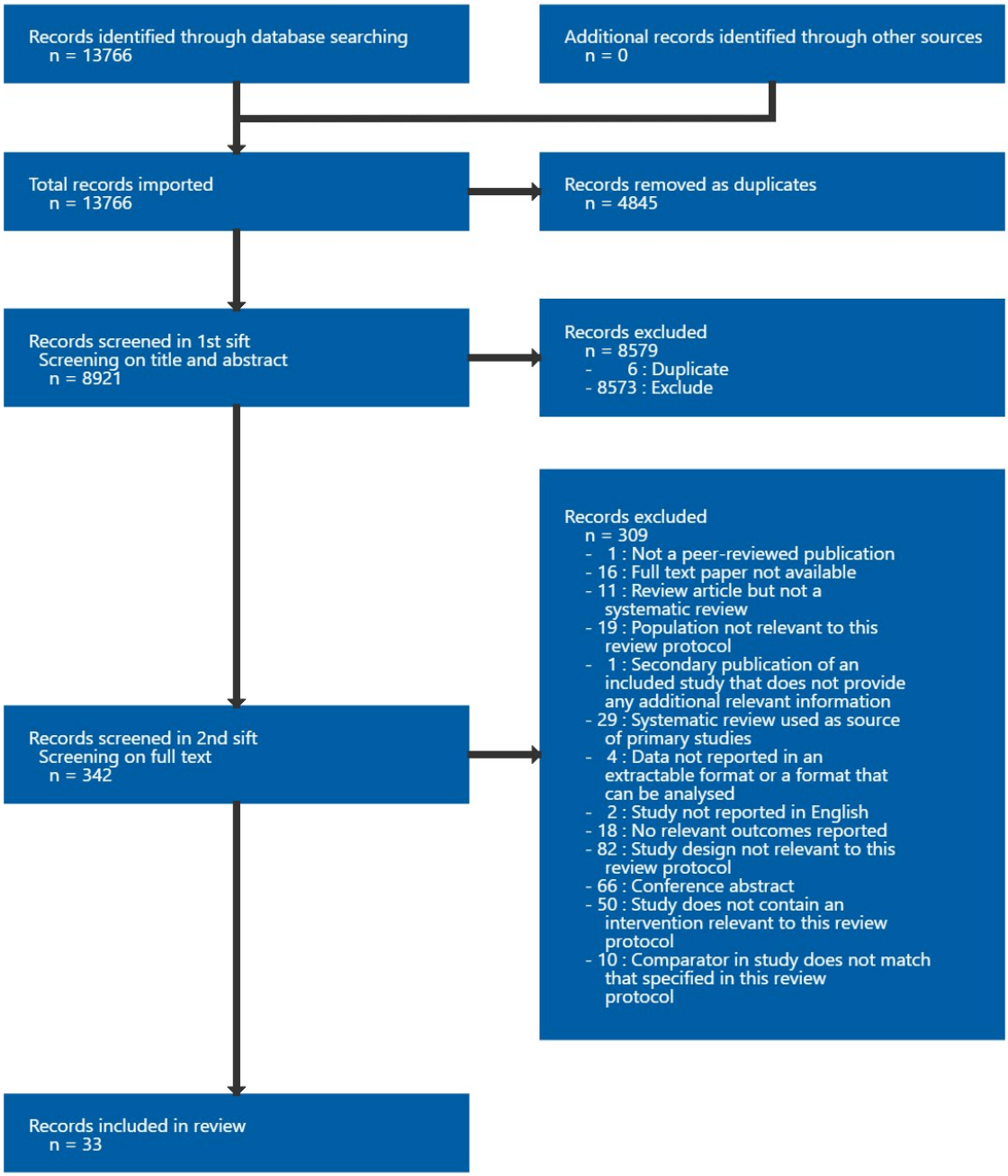
PsycINFO search terms

1.	exp Stroke/
2.	exp Cerebral hemorrhage/
3.	(stroke or strokes or cva or poststroke* or apoplexy or "cerebrovascular accident").ti,ab.
4.	((cerebro* or brain or brainstem or cerebral*) adj3 (infarct* or accident*)).ti,ab.
5.	"brain attack*".ti,ab.
6.	Cerebrovascular accidents/
7.	exp Brain damage/
8.	(brain adj2 injur*).ti.
9.	or/1-8
10.	Letter/
11.	Case report/
12.	exp Rodents/
13.	or/10-12
14.	9 not 13
15.	limit 14 to (human and english language)
16.	First posting.ps.
17.	15 and 16
18.	15 or 17
19	"costs and cost analysis"/
20.	"Cost Containment"/
21.	(economic adj2 evaluation$).ti,ab.

22.	(economic adj2 analy$).ti,ab.
23.	(economic adj2 (study or studies)).ti,ab.
24.	(cost adj2 evaluation$).ti,ab.
25.	(cost adj2 analy$).ti,ab.
26.	(cost adj2 (study or studies)).ti,ab.
27.	(cost adj2 effective$).ti,ab.
28.	(cost adj2 benefit$).ti,ab.
29.	(cost adj2 utili$).ti,ab.
30.	(cost adj2 minimi$).ti,ab.
31.	(cost adj2 consequence$).ti,ab.
32.	(cost adj2 comparison$).ti,ab.
33.	(cost adj2 identificat$).ti,ab.
34.	(pharmacoeconomic$ or pharmaco-economic$).ti,ab.
35.	or/19-34
36.	(0003-4819 or 0003-9926 or 0959-8146 or 0098-7484 or 0140-6736 or 0028-4793 or 1469-493X).is.
37.	35 not 36
38.	18 and 37

Appendix C Effectiveness evidence study selection

Figure 1: Flow chart of clinical study selection for the review of telerehabilitation



Appendix D Effectiveness evidence

1.1.15. Allegue, 2022

Bibliographic Reference	Allegue, Dorra Rakia; Higgins, Johanne; Sweet, Shane N; Archambault, Philippe S; Michaud, Francois; Miller, William; Tousignant, Michel; Kairy, Dahlia; Rehabilitation of Upper Extremity by Telerehabilitation Combined With Exergames in Survivors of Chronic Stroke: Preliminary Findings From a Feasibility Clinical Trial.; JMIR rehabilitation and assistive technologies; 2022; vol. 9 (no. 2); e33745

1.1.15.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	NR
Trial name / registration number	(NCT03759106)
Study type	Randomised controlled trial (RCT)
Study location	Quebec, Canada
Study setting	Community setting
Study dates	NR

Sources of funding	This work was supported by the Canadian Institutes of Health Research (385297, 2017) [32,33], doctoral scholarships from the School of Rehabilitation of Université de Montréal, graduate and postdoctoral studies of Université de Montréal, the Center for Interdisciplinary Research in Rehabilitation of Greater Montreal, and Wilrose Desrosiers and Pauline Dunn Funding. The funding sources were not involved in the research or preparation of this paper
Inclusion criteria	Eligible participants included survivors of stroke (ischemic or hemorrhagic) with residual UE impairment (Chedoke-McMaster arm component, scores 2-6), who stopped receiving rehabilitation services and were able to use the exergame system (eg, move the exergame avatar with the affected UE).
Exclusion criteria	Participants were excluded if they had severe cognitive or communication impairment, uncontrolled medical conditions (eg, cardiac condition), balance deficits, visual impairment, and UE mobility deficits (restricted movements or inability to move the avatar).
Recruitment / selection of participants	Participants were recruited from the archives of rehabilitation centers (offline via a database of potential participants) and the community situated in Montreal (via the ClinicaTtrials.gov website; Quebec, Canada).
Intervention(s)	VirTele is an 8-week home rehabilitation program that includes Jintronix exergames for UE rehabilitation and the Reacts app to conduct videoconference sessions with clinicians.. Before starting the intervention, participants, including clinicians and survivors of chronic stroke, received a 1-hour training session to familiarize themselves with the Jintronix exergames and the Reacts app. The Jintronix exergames included 5 games for UE training (Space Race, Fish Frenzy, Pop Clap, Catch and Carry an apple, and Kitchen clean-up). The clinician adjusted the difficulty parameters of each game remotely (eg, speed, duration, repetitions, and direction of the trajectory) according to the participant's preference and functional abilities. An automated log system of the participant's performance during exergames was available on the Jintronix portal (eg, active time spent on exergames, scores, number of tasks completed, and amount of trunk compensation), allowing the clinician to monitor the participant's progression. The training protocol included five 30-minute sessions of Jintronix exergames per week for 8 weeks, targeting 20 hours of training overall. The Reacts app, a videoconferencing platform, was used by the clinician to schedule videoconference meetings synchronized with sessions when the survivor of stroke was playing exergames to, for example, supervise the participant's performance, correct their posture, grade the difficulty based on performance, and match games to the participant's preferences and needs. The videoconferencing sessions were scheduled as follows: 3 times a week for the first 2 weeks, twice a week for the following 2 weeks, and then once a week for the remaining 4 weeks to maintain motivation, ensure that the exercises are adequately tailored, and identify strategies to maintain the activity level of the UE after the study ended. The training of the VirTele group was conducted at the participant's home after the installation of the equipment and lasted approximately 30 minutes to 1 hour. Clinicians were trained in motivational interviewing before the start of the study. A motivational interviewing guide (discussion plan) based on BCTs and motivational techniques was conceived by the research team and provided to the clinicians as a support tool that can help them choose strategies adapted to the client's needs.

Population subgroups	NR
Subgroup 1 - time after stroke	Chronic (>6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	≤45 minutes
Subgroup 4 - Number of days of treatment per week	5 days per week
Subgroup 5 - Focus of care	Upper limb
Subgroup 6 - Mode of delivery	Videoconferencing
Subgroup 7 - Mode of feedback	Real time communication
Comparator	In Canada, survivors of chronic stroke receive the Graded Repetitive Arm Supplementary Program (GRASP) as a home rehabilitation training program to exercise the affected UE and use it in activities of daily living. Therefore, the control group received the GRASP, which included exercises for the arm and hand (strengthening and range of motion) and functional activities targeting the UE. The control group was invited to perform the GRASP exercises for 8 weeks, 5 days per week (30-minute sessions), targeting 20 hours of exercise overall (same as the experimental group). The time spent on the GRASP program, the number of sessions, and events such as fatigue and pain were reported at T2 after the intervention was terminated. No follow-up was provided during the 8-week intervention period, similar to conventional therapy. However, at the end of the study, the participants were offered one session with the clinician to discuss strategies for improving the use of UE in activities of daily living. All participants received a 30-minute training to familiarize themselves with the GRASP equipment and exercises.
Number of participants	11

Duration of follow-up	post intervention, 3 months and 5 months
Indirectness	NR
Additional comments	NR

1.1.15.2. Study arms

1.1.15.2.1. telerTehabilitation app (VirTele) (N = 6)

VirTele is an 8-week home rehabilitation program that includes Jintronix exergames for UE rehabilitation and the Reacts app to conduct videoconference sessions with clinicians.

1.1.15.2.2. Conventional therapy (N = 5)

Control group received the GRASP, which included exercises for the arm and hand (strengthening and range of motion) and functional activities targeting the UE. The control group was invited to perform the GRASP exercises for 8 weeks, 5 days per week (30-minute sessions), targeting 20 hours of exercise overall (same as the experimental group)

1.1.15.3. Characteristics

1.1.15.3.1. Study-level characteristics

Characteristic	**Study (N = 11)**
Ethnicity Nominal	NR
Comorbidities Range	NR to NR

Characteristic	Study (N = 11)
Severity Nominal	NR
Focus of care required Nominal	NR

1.1.15.3.2. Arm-level characteristics

Characteristic	telerTehabilitation app (VirTele) (N = 6)	Conventional therapy (N = 5)
% Female Sample size	n = 2 ; % = 50	n = 3 ; % = 60
Mean age (SD) Mean (SD)	57.8 (21.8)	56.4 (17.3)
Time period after stroke years Mean (SD)	8 (2)	9.8 (3)

1.1.15.4. Outcomes

1.1.15.4.1. Study timepoints

- Baseline
- 5 month

1.1.15.4.2. Continuous outcomes (1)

Outcome	telerTehabilitation app (VirTele), Baseline, N = 4	telerTehabilitation app (VirTele), 5 month, N = 4	Conventional therapy, Baseline, N = 4	Conventional therapy, 5 month, N = 4
Physical function – upper limb - FMA Scale range: 0-66. Change scores. Calculated from individual patient data reported in the study. Mean (SD)	29.25 (12.28)	4.25 (7.4)	36.25 (18.9)	1.75 (7.08)

Physical function – upper limb - FMA - Polarity - Higher values are better

1.1.15.4.3. Continuous outcomes (2)

Outcome	telerTehabilitation app (VirTele), Baseline, N = 4	telerTehabilitation app (VirTele), 5 month, N = 4	Conventional therapy, Baseline, N = 5	Conventional therapy, 5 month, N = 5
Stroke-specific Patient-Reported Outcome Measures (Stroke Impact Scale-16) Scale range: 0-100. Change scores. Calculated from individual patient data reported in the study. Reported in three subscales. Mean (SD)	NR (*empty data*)	NR (NR)	NR (NR)	NR (NR)
Stroke Impact Scale-16 Hand Function Scale range: 0-100. Change scores.	62.5 (37.5)	-25 (30.62)	25 (27.39)	40 (25.5)

Outcome	telerTehabilitation app (VirTele), Baseline, N = 4	telerTehabilitation app (VirTele), 5 month, N = 4	Conventional therapy, Baseline, N = 5	Conventional therapy, 5 month, N = 5
Calculated from individual patient data reported in the study. Mean (SD)				
Stroke Impact Scale-16 Activities of Daily Living Scale range: 0-100. Change scores. Calculated from individual patient data reported in the study. Mean (SD)	78.25 (21.72)	-5.5 (9.45)	79.4 (16.17)	7 (13.74)
Stroke Impact Scale-16 Mobility Scale range: 0-100. Change scores. Calculated from individual patient data reported in the study. Mean (SD)	74.75 (17.24)	-1.25 (11.52)	80 (14.07)	5.8 (5.74)

Stroke-specific Patient-Reported Outcome Measures (Stroke Impact Scale-16) - Polarity - Higher values are better

1.1.15.4.4. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.15.4.5. Continuousoutcomes-Physicalfunction–upperlimb-FMA-MeanSD-telerTehabilitation app (VirTele)-Conventional therapy-t5

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.15.4.6. Continuousoutcomes(2)-Stroke-specificPatient-ReportedOutcomeMeasures(StrokeImpactScale-16)-StrokeImpactScale-16HandFunction-MeanSD-telerTehabilitation app (VirTele)-Conventional therapy-t5

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.15.4.7. Continuousoutcomes(2)-Stroke-specificPatient-ReportedOutcomeMeasures(StrokeImpactScale-16)-StrokeImpactScale-16ActivitiesofDailyLiving-MeanSD-telerTehabilitation app (VirTele)-Conventional therapy-t5

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.15.4.8. Continuousoutcomes(2)-Stroke-specificPatient-ReportedOutcomeMeasures(StrokeImpactScale-16)-StrokeImpactScale-16Mobility-MeanSD-telerTehabilitation app (VirTele)-Conventional therapy-t5

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.16. Asano, 2021

Bibliographic Reference Asano, Miho; Tai, Bee C; Yeo, Felicity Yt; Yen, Shi C; Tay, Arthur; Ng, Yee S; De Silva, Deidre A; Caves, Kevin; Chew, Eiffie; Hoenig, Helen; Koh, Gerald C; Home-based tele-rehabilitation presents comparable positive impact on self-reported functional outcomes as usual care: The Singapore Tele-technology Aided Rehabilitation in Stroke (STARS) randomised controlled trial.; Journal of telemedicine and telecare; 2021; vol. 27 (no. 4); 231-238

1.1.16.1. Study details

Secondary publication of another included study- see primary study for details	Nr
Other publications associated with this study included in review	NR
Trial name / registration number	NCT01905917 STARS

Study type	Randomised controlled trial (RCT)
Study location	Singapore
Study setting	2 stroke rehabilitation hospitals and community based
Study dates	NR
Sources of funding	The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This trial was supported by a National University of Singapore Cross-Faculty Grant, a Singapore Millennium Foundation Grant (PI: Gerald Koh) and the Singapore Ministry of Health's National Medical Research Council under the Centre Grant Programme – Singapore Population Health Improvement Centre (NMRC/CG/ C026/2017_NUHS).
Inclusion criteria	The inclusion criteria for the trial were: (a) age 40 years, (b) recent stroke (within four weeks prior to recruitment), (c) able to sit unsupported for 30 seconds, (d) able to stand on the non-paretic leg for more than four seconds, (e) able to walk at least two metres with a maximum of one person assisting, (f) able to follow a two-step command, (g) living in the community before the stroke and expected to be discharged home and (h) having a caregiver when the patient was doing the exercises for safety reasons
Exclusion criteria	The exclusion criteria were: (a) a pacemaker in situ, (b) unable to ambulate at least 45 metres prior to stroke or intermittent claudication while walking less than 200 metres, (c) serious cardiac conditions, (d) history of serious chronic obstructive pulmonary disease or oxygen dependence, (e) severe weight-bearing pain, (f) pre-existing neurological disorders, (g) history of major head trauma with severe residual deficits, (h) lower extremity amputation, (i) legal blindness or severe visual impairment, (j) severe uncontrolled psychiatric illness, (k) life expectancy of less than three months, (l) severe arthritis or orthopaedic problems that limit passive ranges of motion of lower extremity, (m) history of sustained alcoholism or drug abuse in the last six months or (n) hypertensive crisis.
Recruitment / selection of participants	Potential participants were identified and recruited for the trial while they were hospitalised
Intervention(s)	The tele-rehab group received a tele-rehabilitation system and standardised rehabilitation programme for three months. The standardized programme comprised both physiotherapy and occupational therapy components. An assigned therapist determined the difficulty level and minimum range of motion desired for each exercise for each patient based on individual need. In addition, for ethical reasons, participants in the tele-rehab group were free to participate in centre-based (conventional or outpatient) rehabilitation if they desired.
Population subgroups	NR

Subgroup 1 - time after stroke	Subacute (7 days - 6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	Unclear/not stated
Subgroup 4 - Number of days of treatment per week	5 days per week
Subgroup 5 - Focus of care	Upper limb Lower limb
Subgroup 6 - Mode of delivery	Videoconferencing
Subgroup 7 - Mode of feedback	Real time communication
Comparator	Stroke patients in Singapore typically receive acute stroke care in an acute hospital, which usually has a dedicated stroke unit. Those who are fully independent in performing activities of daily living (ADLs) normally do not receive any post-stroke rehabilitation. Those who are mild to moderately dependent in performing ADLs are commonly referred for centre-based (conventional or outpatient) rehabilitation after discharge from the acute hospital. Depending on need, patients receive a one-hour centre-based rehabilitation session approximately once or twice a week.15 This (centre based outpatient rehabilitation) was considered as usual rehabilitation care for this trial. In acute hospitals, rehabilitation is usually started soon after stabilization of stroke and would be provided once a day for a total of 1–2 h a day by a physiotherapist and occupational therapist. In inpatient rehabilitation hospitals, rehabilitation is continued upon admission and would be provided twice a day for a total of 2–3 h a day by a physiotherapist and occupational therapist. After discharge, it usually takes 1–2 weeks for centre-based rehabilitation to be initiated and this is usually provided 1–2 times a week for an hour each time.

	Concomitant therapy: none reported
Number of participants	124
Duration of follow-up	3 and 6 months
Indirectness	NR
Additional comments	Nr

1.1.16.2. Study arms

1.1.16.2.1. Telerehabilitation (N = 61)

The tele-rehab group received a tele-rehabilitation system and standardised rehabilitation programme for three months. The standardized programme comprised both physiotherapy and occupational therapy components. An assigned therapist determined the difficulty level and minimum range of motion desired for each exercise for each patient based on individual need. In addition, for ethical reasons, participants in the tele-rehab group were free to participate in centre-based (conventional or outpatient) rehabilitation if they desired.

1.1.16.2.2. Usual care (N = 63)

Stroke patients in Singapore typically receive acute stroke care in an acute hospital, which usually has a dedicated stroke unit. Those who are fully independent in performing activities of daily living (ADLs) normally do not receive any post-stroke rehabilitation. Those who are mild to moderately dependent in performing ADLs are commonly referred for centre-based (conventional or outpatient) rehabilitation after discharge from the acute hospital. Depending on need, patients receive a one-hour centre-based rehabilitation session approximately once or twice a week.15 This (centre based outpatient rehabilitation) was considered as usual rehabilitation care for this trial.

1.1.16.3. Characteristics

1.1.16.3.1. Study-level characteristics

Characteristic	Study (N = 124)
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Severity Nominal	NR
Focus of care required Nominal	NR

1.1.16.3.2. Arm-level characteristics

Characteristic	Telerehabilitation (N = 61)	Usual care (N = 63)
% Female Sample size	n = 29 ; % = 47.5	n = 30 ; % = 47.6
Mean age (SD) Range	40.5 to 89.6	40.7 to 86.6
Time period after stroke Nominal	NR	NR

1.1.16.4. Outcomes

1.1.16.4.1. Study timepoints

- Baseline
- 3 month

1.1.16.4.2. Continuous outcomes

Outcome	Telerehabilitation vs Usual care, Baseline, N2 = 61, N1 = 63	Telerehabilitation vs Usual care, 3 month, N2 = 50, N1 = 48
Person/participant generic health-related quality of life (EQ-5D index) Scale range: -0.11-1. Change scores. Adjusted values. Mean (95% CI)	NA (NA to NA)	-0.05 (-0.15 to 0.05)
Activities of daily living (barthel index) Scale range: 0-100. Change scores. Adjusted values. Mean (95% CI)	NA (NA to NA)	0.49 (-5.43 to 6.41)
Mobility (two-minute walk test) (meters) Change scores. Adjusted values. Mean (95% CI)	NA (NA to NA)	-9.08 (-22.14 to 3.99)
Balance (activities specific balance confidence scale)	NA (NA to NA)	4.31 (-3.34 to 11.96)

Outcome	Telerehabilitation vs Usual care, Baseline, N2 = 61, N1 = 63	Telerehabilitation vs Usual care, 3 month, N2 = 50, N1 = 48
Scale range: 0-100. Change scores. Adjusted values. Mean (95% CI)		

Person/participant generic health-related quality of life (EQ-5D index) - Polarity - Higher values are better
Activities of daily living (barthel index) - Polarity - Higher values are better
Mobility (two-minute walk test) - Polarity - Higher values are better
Balance (activities specific balance confidence scale) - Polarity - Higher values are better

1.1.16.4.3. Continuous outcomes (baseline values)

Outcome	Telerehabilitation, Baseline, N = 61	Telerehabilitation, 3 month, N = 50	Usual care, Baseline, N = 63	Usual care, 3 month, N = 48
Person/participant generic health-related quality of life (EQ-5D index) Scale range: -0.11-1. Change scores. Adjusted values. Mean (SD)	0.78 (0.35)	NA (NA)	0.85 (0.24)	NA (NA)
Activities of daily living (barthel index) Scale range: 0-100. Change scores. Adjusted values. Mean (SD)	74.4 (28.5)	NA (NA)	90.1 (18.8)	NA (NA)
Mobility (two-minute walk test) (meters) Change scores. Adjusted values. Mean (SD)	54.2 (40)	NA (NA)	55.1 (32.1)	NA (NA)

Outcome	Telerehabilitation, Baseline, N = 61	Telerehabilitation, 3 month, N = 50	Usual care, Baseline, N = 63	Usual care, 3 month, N = 48
Balance (activities specific balance confidence scale) Scale range: 0-100. Change scores. Adjusted values. Mean (SD)	43.1 (32.7)	NA (NA)	66.4 (27.9)	NA (NA)

Person/participant generic health-related quality of life (EQ-5D index) - Polarity - Higher values are better
Activities of daily living (barthel index) - Polarity - Higher values are better
Mobility (two-minute walk test) - Polarity - Higher values are better
Balance (activities specific balance confidence scale) - Polarity - Higher values are better

1.1.16.4.4. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.16.4.5. Continuousoutcomes-Person/participantgenerichealth-relatedqualityoflife(EQ-5Dindex)-MeanNineFivePercentCI-Telerehabilitation-Usual care-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.16.4.6. Continuousoutcomes-Activitiesofdailyliving(barthelindex)-MeanNineFivePercentCI-Telerehabilitation-Usual care-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.16.4.7. Continuousoutcomes-Mobility(two-minutewalktest)-MeanNineFivePercentCI-Telerehabilitation-Usual care-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.16.4.8. Continuousoutcomes-Balance(activitiesspecificbalanceconfidencescale)-MeanNineFivePercentCI-Telerehabilitation-Usual care-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.17. Bishop, 2014

Bibliographic Reference	Bishop, Duane; Miller, Ivan; Weiner, Daniel; Guilmette, Thomas; Mukand, Jon; Feldmann, Edward; Keitner, Gabor; Springate, Beth; Family Intervention: Telephone Tracking (FITT): a pilot stroke outcome study.; Topics in stroke rehabilitation; 2014; vol. 21suppl1; 63-74

1.1.17.1. Study details

Secondary publication of another included study- see primary study for details	No additional information.
Other publications associated with this study included in review	This paper was included in the Cochrane review that this review was based on: Laver KE, Adey-Wakeling Z, Crotty M, Lannin NA, George S, Sherrington C. Telerehabilitation services for stroke. Cochrane Database of Systematic Reviews 2020, Issue 1. Art. No.: CD010255. For further information about the data extraction please see the Cochrane review.
Trial name / registration number	No additional information.
Study type	Randomised controlled trial (RCT)
Study location	United States of America.
Study setting	Home.
Study dates	No additional information.
Sources of funding	National Institute for Mental Health NIMH grant 1 R21 MH54182-01 (April 1, 1994 to March 31, 1998)
Inclusion criteria	Fully oriented and able to follow a 3-step command and had either evidence of stroke on neuroimaging or were hemiparetic. Caregivers were defined as family or friends living with survivors or within a 30-minute driving distance and acting as the primary source of assistance for survivors.

Exclusion criteria	<35 years old; subarachnoid haemorrhage; psychosis; lack of a caregiver; admission from a nursing home; non-English speaking.
Recruitment / selection of participants	No additional information.
Intervention(s)	Combined telerehabilitation and usual rehabilitation (FITT) N=23 FITT (Family Intervention Telephone Tracking) plus SMF (standard medical follow-up). FITT consists of telephone contacts with both survivors and caregivers after discharge. The primary goal is to assist them in identifying problems during the transition back home. It focuses on: a) family functioning, b) mood, c) neurocognitive functioning, d) functional independence, e) physical health. Expectations and transitional challenges within each are discussed. To reinforce attention to these areas, people were given a sheet containing a grid listing each area on one side and vertical rating columns of worse, same and better. During the calls they were always asked to use the grid to assist them in rating themselves and their partners in the 5 areas. Telephone contacts were designed to identify and address problems in these key areas, provide psychoeducation, facilitate the dyad's problem solving, and provide follow-up support. No direct treatment of psychiatric or family problems were given, but participants were supported in seeking referrals for special assessment or treatment as required. This consisted of 2 main components: psychoeducation and follow-up. The psychoeducational component reviewed the intervention's rationale, including the importance of attending to the 5 key areas, the caregiver and a focus on the family, and discusses stroke-related education (ie, stroke prevention). Attention to the caregiver is reinforced by making calls to stroke survivors and caregivers and asking them individually to rate themselves and their partners as the same, better or worse in each of the 5 areas. Each survivor-caregiver dyad was provided with a packet of information and resources (eg, the American Heart Association brochure on aphasia) that served as references when issues were identified during calls. The follow-up component included telephone contacts that were made separately to survivors and caregivers and used to identify changes, reinforce psychoeducational concepts, check for emergency of new problems and facilitate the dyad's problem solving. A central goal was to reinforce the dyad and family resources and capabilities. Telephone contacts took place over 6 months after discharge with the intervention formally beginning after the person arrived home. Contacts occurred weekly for 6 weeks, biweekly for the next 2 months, and then monthly for 2 months, for a total of 13 calls to each individual (26 calls per dyad). Concomitant therapy: Standard medical follow up was available to all.

Population subgroups	No additional information.
Subgroup 1 - time after stroke	Subacute (7 days - 6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	≤45 minutes
Subgroup 4 - Number of days of treatment per week	<5 days a week
Subgroup 5 - Focus of care	Mixed (including multidisciplinary packages of care)
Subgroup 6 - Mode of delivery	Telephone
Subgroup 7 - Mode of feedback	Real time communication
Comparator	Usual care (standard medical follow-up) N=26 Standard medical follow-up only. Concomitant therapy: Standard medical follow up was available to all.
Number of participants	49 stroke survivors (49 caregivers)
Duration of follow-up	6 months.

Indirectness	No additional information.
Additional comments	Intention to treat analysis.

1.1.17.2. Study arms

1.1.17.2.1. Combined telerehabilitation and usual rehabilitation (FITT) (N = 23)

FITT (Family Intervention Telephone Tracking) plus SMF (standard medical follow-up). FITT consists of telephone contacts with both survivors and caregivers after discharge. The primary goal is to assist them in identifying problems during the transition back home. It focuses on: a) family functioning, b) mood, c) neurocognitive functioning, d) functional independence, e) physical health. Expectations and transitional challenges within each are discussed. To reinforce attention to these areas, people were given a sheet containing a grid listing each area on one side and vertical rating columns of worse, same and better. During the calls they were always asked to use the grid to assist them in rating themselves and their partners in the 5 areas. Telephone contacts were designed to identify and address problems in these key areas, provide psychoeducation, facilitate the dyad's problem solving, and provide follow-up support. No direct treatment of psychiatric or family problems were given, but participants were supported in seeking referrals for special assessment or treatment as required. This consisted of 2 main components: psychoeducation and follow-up. The psychoeducational component reviewed the intervention's rationale, including the importance of attending to the 5 key areas, the caregiver and a focus on the family, and discusses stroke-related education (ie, stroke prevention). Attention to the caregiver is reinforced by making calls to stroke survivors and caregivers and asking them individually to rate themselves and their partners as the same, better or worse in each of the 5 areas. Each survivor-caregiver dyad was provided with a packet of information and resources (eg, the American Heart Association brochure on aphasia) that served as references when issues were identified during calls. The follow-up component included telephone contacts that were made separately to survivors and caregivers and used to identify changes, reinforce psychoeducational concepts, check for emergency of new problems and facilitate the dyad's problem solving. A central goal was to reinforce the dyad and family resources and capabilities. Telephone contacts took place over 6 months after discharge with the intervention formally beginning after the person arrived home. Contacts occurred weekly for 6 weeks, biweekly for the next 2 months, and then monthly for 2 months, for a total of 13 calls to each individual (26 calls per dyad). Concomitant therapy: Standard medical follow up was available to all.

1.1.17.2.2. Usual care (standard medical follow-up) (N = 26)

Standard medical follow-up only. Concomitant therapy: Standard medical follow up was available to all.

1.1.17.3. Characteristics

1.1.17.3.1. Study-level characteristics

Characteristic	Study (N = 49)
% Female Sample size	n = 32 ; % = 65.3
Mean age (SD) Mean (SD)	70.1 (11.6)
Ethnicity Sample size	n = NA ; % = NA
Caucasian Sample size	n = 43 ; % = 87.8
Black Sample size	n = 5 ; % = 10.2
Native American Sample size	n = 1 ; % = 2
Time period after stroke Mean (SD)	NR (NR)
Severity Mean (SD)	NR (NR)

Characteristic	Study (N = 49)
Focus of care required Sample size	n = NR ; % = NR

1.1.17.3.2. Arm-level characteristics

Characteristic	Combined telerehabilitation and usual rehabilitation (FITT) (N = 23)	Usual care (standard medical follow-up) (N = 26)
Comorbidities Sample size	n = NA ; % = NA	n = NA ; % = NA
Myocardial infarction Sample size	n = 2 ; % = 4	n = 5 ; % = 19
Hypertension Sample size	n = 14 ; % = 61	n = 20 ; % = 87
Congestive heart failure Sample size	n = 0 ; % = 0	n = 2 ; % = 7
Peripheral vascular disease Sample size	n = 0 ; % = 0	n = 2 ; % = 7
Pulmonary disease Sample size	n = 1 ; % = 4	n = 6 ; % = 23

Characteristic	Combined telerehabilitation and usual rehabilitation (FITT) (N = 23)	Usual care (standard medical follow-up) (N = 26)
Insulin dependent diabetes mellitus Sample size	n = 3 ; % = 13	n = 7 ; % = 27
Non-insulin dependent diabetes mellitus Sample size	n = 1 ; % = 4	n = 2 ; % = 7
Gastrointestinal Sample size	n = 7 ; % = 30	n = 2 ; % = 7
Arthritis (osteo and rheumatoid) Sample size	n = 3 ; % = 13	n = 5 ; % = 19
Cancer history Sample size	n = 1 ; % = 4	n = 3 ; % = 11
Genitourinary Sample size	n = 0 ; % = 0	n = 0 ; % = 0
Other Sample size	n = 9 ; % = 39	n = 4 ; % = 15

1.1.17.4. Outcomes

1.1.17.4.1. Study timepoints

- Baseline
- 3 month (<6 months)
- 6 month (≥6 months)

1.1.17.4.2. Continuous outcomes

Outcome	Combined telerehabilitation and usual rehabilitation (FITT), Baseline, N = 23	Combined telerehabilitation and usual rehabilitation (FITT), 3 month, N = 23	Combined telerehabilitation and usual rehabilitation (FITT), 6 month, N = 23	Usual care (standard medical follow-up), Baseline, N = 26	Usual care (standard medical follow-up), 3 month, N = 26	Usual care (standard medical follow-up), 6 month, N = 26
Activities of daily living (functional independence measure) Scale range: 18-126. Change scores. Mean (SD)	NR (NR)	-23 (24)	-15.9 (22)	NR (NR)	-13.2 (16)	-14.6 (22)
Psychological distress - Depression (Geriatric depression scale - short form) Scale range: 0-15. Change scores.	NR (NR)	0 (2.8)	0.69 (3.5)	NR (NR)	-1.27 (2.3)	-1.12 (2.8)

Outcome	Combined telerehabilitation and usual rehabilitation (FITT), Baseline, N = 23	Combined telerehabilitation and usual rehabilitation (FITT), 3 month, N = 23	Combined telerehabilitation and usual rehabilitation (FITT), 6 month, N = 23	Usual care (standard medical follow-up), Baseline, N = 26	Usual care (standard medical follow-up), 3 month, N = 26	Usual care (standard medical follow-up), 6 month, N = 26
Mean (SD)						

Activities of daily living (functional independence measure) - Polarity - Higher values are better
Psychological distress - Depression (Geriatric depression scale - short form) - Polarity - Lower values are better

1.1.17.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.17.4.4. Continuousoutcomes-Activitiesofdailyliving(functionalindependencemeasure)-MeanSD-Combined telerehabilitation and usual rehabilitation (FITT)-Usual care (standard medical follow-up)-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.17.4.5. Continuousoutcomes-Activitiesofdailyliving(functionalindependencemeasure)-MeanSD-Combined telerehabilitation and usual rehabilitation (FITT)-Usual care (standard medical follow-up)-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable

1.1.17.4.6. Continuousoutcomes-Psychologicaldistress-Depression(Geriatricdepressionscale-shortform)-MeanSD-Combined telerehabilitation and usual rehabilitation (FITT)-Usual care (standard medical follow-up)-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.17.4.7. Continuousoutcomes-Psychologicaldistress-Depression(Geriatricdepressionscale-shortform)-MeanSD-Combined telerehabilitation and usual rehabilitation (FITT)-Usual care (standard medical follow-up)-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.18. Bizovicar, 2017

Bibliographic Reference	Bizovicar, N.; Rudolf, M.; Javh, M.; Goljar, N.; Rudel, D.; Obrzan, D.; Burger, H.; Tele-rehabilitation service at home for patients after stroke; Cerebrovascular Diseases; 2017; vol. 43 (no. supplement1); 61

1.1.18.1. Study details

Secondary publication of another included study- see primary study for details	No additional information
Other publications associated with this study included in review	This paper was included in the Cochrane review that this review was based on: Laver KE, Adey-Wakeling Z, Crotty M, Lannin NA, George S, Sherrington C. Telerehabilitation services for stroke. Cochrane Database of Systematic Reviews 2020, Issue 1. Art. No.: CD010255. For further information about the data extraction please see the Cochrane review. No data was accessible from the study for this so all information is extracted directly from the Cochrane review.
Study type	Randomised controlled trial (RCT)
Study location	Slovenia
Study setting	Home.
Study dates	No additional information.
Sources of funding	No additional information.
Inclusion criteria	Stroke, requiring help with ADLs (FIM score 40 to 80)
Exclusion criteria	Orthopaedic problems, other neurological diseases and severe health complications that would prevent participation
Recruitment / selection of participants	Recruited from patients discharged from inpatient stroke rehabilitation in Slovenia.
Intervention(s)	Telerehabilitation N=5 Participants were taught how to use a computer tablet and access selected videos on a web portal. Training focused on posture and exercises for the neck, shoulders, torso, and upper limbs. The participant was asked to do exercises daily 3 months after discharge from the rehabilitation setting. Therapists interviewed the participant and relatives once a week

	during which they checked adherence to exercises, answered questions, monitored progress, and adjusted the content of the exercise programme, as required. Concomitant therapy: No additional information.
Population subgroups	No additional information.
Subgroup 3 - Minutes/hours of intervention per day	Unclear/not stated
Subgroup 4 - Number of days of treatment per week	7 days a week
Subgroup 5 - Focus of care	Upper limb
Subgroup 6 - Mode of delivery	Videoconferencing
Subgroup 7 - Mode of feedback	Real time communication
Comparator	Usual care N=5 Classified as usual care. Were provided with oral and written instructions for similar exercises. The person was instructed to do the exercises of their choice and abilities 1 to 2 times per day. Concomitant therapy: No additional information.
Number of participants	10

Duration of follow-up	3 months
Indirectness	No additional information
Additional comments	No additional information

1.1.18.2. Study arms

1.1.18.2.1. Telerehabilitation (N = 5)

Participants were taught how to use a computer tablet and access selected videos on a web portal. Training focused on posture and exercises for the neck, shoulders, torso, and upper limbs. The participant was asked to do exercises daily 3 months after discharge from the rehabilitation setting. Therapists interviewed the participant and relatives once a week during which they checked adherence to exercises, answered questions, monitored progress, and adjusted the content of the exercise programme, as required. Concomitant therapy: No additional information.

1.1.18.2.2. Usual care (N = 5)

Classified as usual care. Were provided with oral and written instructions for similar exercises. The person was instructed to do the exercises of their choice and abilities 1 to 2 times per day. Concomitant therapy: No additional information.

1.1.18.3. Characteristics

1.1.18.3.1. Arm-level characteristics

Characteristic	Telerehabilitation (N = 5)	Usual care (N = 5)
% Female Sample size	n = 2 ; % = 40	n = 3 ; % = 60

Characteristic	Telerehabilitation (N = 5)	Usual care (N = 5)
Mean age (SD) (years) Mean (SD)	70 (*empty data*)	63 (NR)
Ethnicity Sample size	n = NR ; % = NR	n = NR ; % = NR
Comorbidities Sample size	n = NR ; % = NR	n = NR ; % = NR
Time period after stroke (Months) Mean (SD)	8.2 (NR)	5.1 (NR)
Severity Mean (SD)	NR (NR)	NR (NR)
Focus of care required Sample size	n = NR ; % = NR	n = NR ; % = NR

1.1.18.4. Outcomes

1.1.18.4.1. Study timepoints

- Baseline
- 3 month (<6 months)

1.1.18.4.2. Continuous outcomes

Outcome	Telerehabilitation, Baseline, N = 5	Telerehabilitation, 3 month, N = 5	Usual care, Baseline, N = 5	Usual care, 3 month, N = 5
Physical function - upper limb (Fugl Meyer Assessment - upper limb) Assumed scale reported in the Cochrane review. Scale range: 0-66. Final values. Mean (SD)	NR (NR)	34.4 (26.93)	NR (NR)	24.2 (17.46)

Physical function - upper limb (Fugl Meyer Assessment - upper limb) - Polarity - Higher values are better

1.1.18.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.18.4.4. Continuousoutcomes-Physicalfunction-upperlimb(FuglMeyerAssessment-upperlimb)-MeanSD-Telerehabilitation-Usual care-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.19. Boter, 2004

Bibliographic Reference	Boter, Han; HESTIA Study, Group; Multicenter randomized controlled trial of an outreach nursing support program for recently discharged stroke patients.; Stroke; 2004; vol. 35 (no. 12); 2867-72

1.1.19.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	This paper was included in the Cochrane review that this review was based on: Laver KE, Adey-Wakeling Z, Crotty M, Lannin NA, George S, Sherrington C. Telerehabilitation services for stroke. Cochrane Database of Systematic Reviews 2020, Issue 1. Art. No.: CD010255. For further information about the data extraction please see the Cochrane review.
Trial name / registration number	NR
Study type	Randomised controlled trial (RCT)
Study location	Holland
Study setting	12 hospitals in the Netherlands
Study dates	NR
Sources of funding	This study was supported by an established clinical investigator grant from the Netherlands Heart Foundation to G.J.E.R. (grant D98.014), by a grant from the Netherlands Heart Foundation and the Netherlands Organization for Health Research and Development (940-32- 014), and by a grant from the University Medical Center Utrecht.
Inclusion criteria	Inclusion criteria: Dutch speaking, ≥ 18 years of age, first admission for a stroke, hospitalisation within 72 hours after onset of symptoms, life expectancy > 1 year, independent from or partially dependent on discharge (Rankin grade 0 to 3), discharged home, residence within 40 kilometres of catchment areas served by hospitals
Exclusion criteria	Exclusion criteria: failure to meet above criteria

Recruitment / selection of participants	NR
Intervention(s)	Telerehabilitation intervention: 3 nurses initiated telephone contacts (1 to 4; 4 to 8; and 18 to 24 weeks after discharge) and visits to participants in their homes (10 to 14 weeks after discharge). Stroke nurses used a standardised checklist of risk factors for stroke, consequences of stroke and unmet needs for services. Nurses supported participants and caregivers according to their individual needs (e.g. by providing information or reassurance) or advised participants to contact their GP when further follow-up was required. Written educational material was provided and discussed. Nurses aimed to support participants and caregivers in solving problems themselves or coping with them rather than solving problems for them.
Population subgroups	NR
Subgroup 1 - time after stroke	Subacute (7 days - 6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	Unclear/not stated
Subgroup 4 - Number of days of treatment per week	<5 days a week
Subgroup 5 - Focus of care	Mood Unclear/not stated
Subgroup 6 - Mode of delivery	Telephone
Subgroup 7 - Mode of feedback	Real time communication
Comparator	Standard care: no details provided

Number of participants	536
Duration of follow-up	6 months
Indirectness	NR
Additional comments	NR

1.1.19.2. Study arms

1.1.19.2.1. Standard care plus outreach telerehabilitation provided by nurses post discharge (N = 263)

1.1.19.2.2. Standard care (N = 273)

1.1.19.3. Characteristics

1.1.19.3.1. Study-level characteristics

Characteristic	**Study (N = 536)**
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Severity	NR

Characteristic	Study (N = 536)
Nominal	
Focus of care required Nominal	NR

1.1.19.3.2. Arm-level characteristics

Characteristic	Standard care plus outreach telerehabilitation provided by nurses post discharge (N = 263)	Standard care (N = 273)
% Female Sample size	n = 133 ; % = 51	n = 143 ; % = 52
Mean age (SD) Median (IQR)	66 (52 to 76)	63 (51 to 74)
Time period after stroke Median (IQR)	13 (8 to 20)	13 (7 to 19)

1.1.19.4. Outcomes

1.1.19.4.1. Study timepoints

- Baseline
- 6 month

1.1.19.4.2. Continuous outcomes

Outcome	Standard care plus outreach telerehabilitation provided by nurses post discharge, Baseline, N = 263	Standard care plus outreach telerehabilitation provided by nurses post discharge, 6 month, N = 236	Standard care, Baseline, N = 273	Standard care, 6 month, N = 252
Activities of daily living - Barthel Index 0-100 (values taken from the Cochrane review as study reports median IQR) Mean (SD)	NR (NR)	19.3 (2.2)	NR (NR)	19.3 (1.8)

Activities of daily living - Barthel Index - Polarity - Higher values are better

1.1.19.4.3. continuous outcomes

Outcome	Standard care plus outreach telerehabilitation provided by nurses post discharge, Baseline, N = 263	Standard care plus outreach telerehabilitation provided by nurses post discharge, 6 month, N = 229	Standard care, Baseline, N = 273	Standard care, 6 month, N = 250
Psychological distress - HADS depression subscale 0-100 (values taken directly from the Cochrane review as study reports median IQR) Mean (SD)	NR (NR)	71.5 (20.2)	NR (NR)	69.1 (19.9)

Psychological distress - HADS depression subscale - Polarity - Lower values are better

1.1.19.4.4. Dichotomous outcomes

Outcome	Standard care plus outreach telerehabilitation provided by nurses post discharge, Baseline, N = 263	Standard care plus outreach telerehabilitation provided by nurses post discharge, 6 month, N = 263	Standard care, Baseline, N = 273	Standard care, 6 month, N = 273
Withdrawal due to adverse events (mortality) not reported in the Cochrane review No of events	n = NR ; % = NR	n = 7 ; % = 2.6	n = NR ; % = NR	n = 5 ; % = 1.8

Withdrawal due to adverse events - Polarity - Lower values are better

1.1.19.4.5. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.19.4.6. Continuousoutcomes-Activitiesofdailyliving-BarthelIndex-MeanSD-Standard care plus outreach telerehabilitation provided by nurses post discharge-Standard care-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Due to missing data)*
Overall bias and Directness	Overall Directness	Directly applicable

1.1.19.4.7. continuousoutcomes-Psychologicaldistress-HADSdepressionsubscale-MeanSD-Standard care plus outreach telerehabilitation provided by nurses post discharge-Standard care-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Due to missing data)*
Overall bias and Directness	Overall Directness	Directly applicable

1.1.19.4.8. Dichotomousoutcomes-Withdrawalduetoadverseevents-NoOfEvents-Standard care plus outreach telerehabilitation provided by nurses post discharge-Standard care-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Due to missing data)*
Overall bias and Directness	Overall Directness	Directly applicable

1.1.20. Burgos, 2020

Bibliographic Reference	Burgos PI; Lara O; Lavado A; Rojas-Sepúlveda I; Delgado C; Bravo E; Kamisato C; Torres J; Castañeda V; Cerda M; Exergames and Telerehabilitation on Smartphones to Improve Balance in Stroke Patients.; Brain sciences; 2020; vol. 10 (no. 11)

1.1.20.1. Study details

Secondary publication of another included	NR

study- see primary study for details	
Other publications associated with this study included in review	NR
Trial name / registration number	NR
Study type	Randomised controlled trial (RCT)
Study location	Chile
Study setting	All patients were undergoing physical therapy at the Hospital Clínico de la Universidad de Chile (HCUCH) or at Hospital San José (HSJ), both located in Santiago, Chile. Home based rehabilitation.
Study dates	NR
Sources of funding	This research was partially funded by CIMT/HCUCH-Telemedicine Project of Universidad de Chile. The authors acknowledge partial financial support from the National Agency for Research and Development (ANID) projects ICN09_015, PIA ACT192015, and FONDECYT 1118133, 11170475; CORFO (16CTTS-66390, 17CONTEC-78959) and DAAD (57220037, 57168868).
Inclusion criteria	Participants' inclusion criteria were to have a biped time > 30 s, a Berg Balance Scale (BBS) < 50, and at least one caregiver at home
Exclusion criteria	NR
Recruitment / selection of participants	All patients were undergoing physical therapy at the Hospital Clínico de la Universidad de Chile (HCUCH) or at Hospital San José (HSJ), both located in Santiago, Chile. Patients were invited to participate between August 2018 and July 2019 after approval of the HCUCH ethical committee
Intervention(s)	The Tele PT group received 9 sessions of 30 min per week for 4 weeks. In each session, participants trained in balance tasks using smartphone-based exergames controlled by body motions. After equipment delivery as well as participant and caregiver training, the therapist remotely monitored home progress using the web platform. Daily contact was kept via whats app as a way to increase protocol adherence and to be responsive to any detected technical problem promptly. The equipment was delivered to each study participant at home, with alarms set up 15 min ahead of exercise times. If a participant did not perform the session, the therapist called the participant via telephone. Therapist monitoring was done by

	connecting to the web platform and watching games scores daily at the scheduled session time or afterwards based on therapist availability. The participant exercised at home using the proposed system while games scores and IMU recordings were sent to the platform database for monitoring. After 4 weeks, the protocol ended by repeating the balance assessment. An Android-based smartphone (Samsung Galaxy J7 Prime 2016) integrated with two wireless inertial movement sensors was used. Sensors were positioned using velcro fasteners at the lumbar level (posterior middle line) and at the anterior thigh of the paretic side. Participants interacted with our custom-developed Android app, including a calibration stage that recorded participants' stability limits. The physical therapist, on the other hand, operated a customized web platform to monitor participants' activity and adherence. Participants were able to modify their own routine difficulty level as they progressed in the protocol, which was determined by their calibration results. Six exergames were specifically built in our app to specifically promote the following: (1) antero-posterior increase in stability limits, (2) medio-lateral increase in stability limits, (3) anticipatory adjustments in sit to stand transfer, (4) standing postural oscillations reduction, (5) reactive balance, and (6) training of dynamic anticipatory postural control through dancing. Concomitant therapy - groups received their standard rehabilitation treatment at the hospital site, (3 sessions of 40 min per week of physical therapy for 4 weeks).
Population subgroups	NR
Subgroup 1 - time after stroke	Subacute (7 days - 6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	1-2 hours
Subgroup 4 - Number of days of treatment per week	6 days a week
Subgroup 5 - Focus of care	Functional independency Balance
Subgroup 6 - Mode of delivery	Videoconferencing

Subgroup 7 - Mode of feedback	Real time communication
Comparator	The control group received their standard rehabilitation treatment at the hospital site, (3 sessions of 40 min per week of physical therapy for 4 weeks).
Number of participants	10
Duration of follow-up	4 weeks
Indirectness	NR
Additional comments	Nr

1.1.20.2. Study arms

1.1.20.2.1. tele rehabilitation balance training (N = 6)

The Tele PT group received 9 sessions of 30 min per week for 4 weeks. In each session, participants trained in balance tasks using smartphone-based exergames controlled by body motions. After equipment delivery as well as participant and caregiver training, the therapist remotely monitored home progress using the web platform. The participant exercised at home using the proposed system while games scores and IMU recordings were sent to the platform database for monitoring. After 4 weeks, the protocol ended by repeating the balance assessment. An Android-based smartphone (Samsung Galaxy J7 Prime 2016) integrated with two wireless inertial movement sensors was used. Sensors were positioned using velcro fasteners at the lumbar level (posterior middle line) and at the anterior thigh of the paretic side. Participants interacted with our custom-developed Android app, including a calibration stage that recorded participants' stability limits. The physical therapist, on the other hand, operated a customized web platform to monitor participants' activity and adherence. Participants were able to modify their own routine difficulty level as they progressed in the protocol, which was determined by their calibration results. Six exergames were specifically built in our app to specifically promote the following: (1) antero-posterior increase in stability limits, (2) medio-lateral increase in stability limits, (3) anticipatory adjustments in sit to stand transfer, (4) standing postural oscillations reduction, (5) reactive balance, and (6) training of dynamic anticipatory postural control through dancing. Concomitant therapy - groups received their standard rehabilitation treatment at the hospital site, (3 sessions of 40 min per week of physical therapy for 4 weeks).

1.1.20.2.2. Face to face rehabilitation (N = 4)

The control group received their standard rehabilitation treatment at the hospital site, (3 sessions of 40 min per week of physical therapy for 4 weeks).

1.1.20.3. Characteristics

1.1.20.3.1. Study-level characteristics

Characteristic	Study (N = 10)
Mean age (SD) Range	46 to 79
Ethnicity Nominal	NR
Time period after stroke Nominal	NR
Severity Nominal	NR
Focus of care required Nominal	NR

1.1.20.3.2. Arm-level characteristics

Characteristic	tele rehabilitation balance training (N = 6)	Face to face rehabilitation (N = 4)
% Female Sample size	*empty data*	n = 1 ; % = 25
Comorbidities Sample size	n = NR ; % = NR	n = NR ; % = NR
Dyslipidemia Sample size	n = 2 ; % = 33	n = 3 ; % = 75
Hypertension Sample size	n = 5 ; % = 83.3	n = 2 ; % = 50
Diabetes Sample size	n = 4 ; % = 66.7	n = 0 ; % = 0

1.1.20.4. Outcomes

1.1.20.4.1. Study timepoints

- Baseline
- 4 week

1.1.20.4.2. Continuous outcomes

Outcome	tele rehabilitation balance training, Baseline, N = 6	tele rehabilitation balance training, 4 week, N = 6	Face to face rehabilitation , Baseline, N = 4	Face to face rehabilitation , 4 week, N = 4
Balance (Berg Balance Scale) Scale range: 0-56. Change scores. Calculated from individual patient data reported in the study. Mean (SD)	35 (4)	11.3 (3.3)	35.8 (9.8)	7 (4.2)
Activities of daily living (barthel index) Scale range: 0-100. Change scores. Calculated from individual patient data reported in the study. Mean (SD)	65 (4.1)	17.5 (9)	61.3 (24.8)	3.8 (7.4)

Balance (Berg Balance Scale) - Polarity - Higher values are better
Activities of daily living (barthel index) - Polarity - Higher values are better

1.1.20.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.20.4.4. Continuousoutcomes-Balance(BergBalanceScale)finalvalue-MeanSD-tele rehabilitation balance training-Face to face rehabilitation -t4

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable

1.1.20.4.5. Continuousoutcomes-Activitiesofdailyliving-BarthelIndex-changescore-MeanSD-tele rehabilitation balance training-Face to face rehabilitation -t4

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.21. Chen, 2017

Bibliographic Reference Chen, Jing; Jin, Wei; Dong, Wen Shuai; Jin, Yan; Qiao, Feng Lei; Zhou, Ya Fei; Ren, Cheng Chuan; Effects of Home-based Telesupervising Rehabilitation on Physical Function for Stroke Survivors with Hemiplegia: A Randomized Controlled Trial.; American journal of physical medicine & rehabilitation; 2017; vol. 96 (no. 3); 152-160

1.1.21.1. Study details

Secondary publication of another included study- see primary study for details	NR

Other publications associated with this study included in review	This paper was included in the Cochrane review that this review was based on: Laver KE, Adey-Wakeling Z, Crotty M, Lannin NA, George S, Sherrington C. Telerehabilitation services for stroke. Cochrane Database of Systematic Reviews 2020, Issue 1. Art. No.: CD010255. For further information about the data extraction please see the Cochrane review.
Trial name / registration number	ChiCTRTRC-14005233)
Study type	Randomised controlled trial (RCT)
Study location	China
Study setting	Shanghai 5th People's Hospital Affiliated to Fudan University, Shanghai, China and home based
Study dates	NR
Sources of funding	This trial is funded by a project grant from Shanghai Strategic Emerging Industries Project Plan (number 2013SJXW152). The apparatus used in this study were developed and provided by Shanghai NCC Electronic Co. Ltd.
Inclusion criteria	Inclusion criteria: aged 35 to 85 years old; first diagnosis was ischaemic or haemorrhagic stroke or recurrent stroke but without hemiplegia symptoms before; have a symptom of hemiplegia, leM or right; 14 to 90 days from stroke onset; National Institute of Health Stroke Scale scores from 2 to 20 and mRS scores from 1 to 5; have not previously received any rehabilitation intervention since this stroke onset
Exclusion criteria	Exclusion criteria: Glasgow Coma Scale scores under 15, have been confirmed as having dementia based on Mini Mental State Examination assessment, with mental disorders and unable to cooperate with examination, treatment or follow-up; disability not induced by stroke or disability induced by historical stroke; associated severe primary disease of heart, liver, kidney, or haematological system; cognitive disorder, history of psychosis, substance abuse, or alcoholism; skin infections in the areas of surface electrodes attached; metal implants in the body, including cardiac pacemaker, metal stent, or steel plate; in the gestation or lactation period or have a fertility plan; associated malignant tumour or severe progressive disease in any other system; have been recruited by any other clinical trial in the preceding 90 days; unable to complete the basic course of treatment, with poor treatment adherence or inability to follow-up
Recruitment / selection of participants	NR

Intervention(s)	Individualised telerehabilitation physical exercise plan selected by treating therapists and provided as prescription within the telerehabilitation apparatus. Therapists explained and demonstrated exercises. After discharge, participants received rehabilitation via the telerehabilitation system; therapists supervised via live video and collected data remotely. Therapists were available for advice if needed. Carers kept training logs of training. Parameters of vital signs were recorded by physiological data collection system during the process of therapy. These logs, physiological data, and EMG signal gave feedback to the therapist end for supervision and analysis by the therapists. Concomitant therapy: After discharge, participants in both groups were given physical exercises and electromyography-triggered neuromuscular stimulation (ETNS). Exercises were conducted for 1 hour, twice in a working day for 12 weeks (total = 60 sessions). ETNS was conducted by using a portable muscle electricity biofeedback instrument for 20 minutes, twice in a working day for 12 weeks, a total of 60 session
Population subgroups	NR
Subgroup 1 - time after stroke	Subacute (7 days - 6 months)
Subgroup 2 - Severity	Moderate (or NIHSS 5-14)
Subgroup 3 - Minutes/hours of intervention per day	1-2 hours
Subgroup 4 - Number of days of treatment per week	5 days per week
Subgroup 5 - Focus of care	Upper limb Lower limb
Subgroup 6 - Mode of delivery	Videoconferencing
Subgroup 7 - Mode of feedback	Real time communication

Comparator	Control intervention: received rehabilitation in the outpatient therapy department. Exercises and ETNS were the same but the therapy was provided face-to-face with therapists.
Number of participants	54
Duration of follow-up	3 and 6 months
Indirectness	NR
Additional comments	NR

1.1.21.2. Study arms

1.1.21.2.1. Telerehabilitation (N = 27)

Individualised telerehabilitation physical exercise plan selected by treating therapists and provided as prescription within the telerehabilitation apparatus. Therapists explained and demonstrated exercises. After discharge, participants received rehabilitation via the telerehabilitation system; therapists supervised via live video and collected data remotely. Therapists were available for advice if needed. Carers kept training logs of training. Parameters of vital signs were recorded by physiological data collection system during the process of therapy. These logs, physiological data, and EMG signal gave feedback to the therapist end for supervision and analysis by the therapists. Concomitant therapy: After discharge, participants in both groups were given physical exercises and electromyography-triggered neuromuscular stimulation (ETNS). Exercises were conducted for 1 hour, twice in a working day for 12 weeks (total = 60 sessions). ETNS was conducted by using a portable muscle electricity biofeedback instrument for 20 minutes, twice in a working day for 12 weeks, a total of 60 session

1.1.21.2.2. In person (N = 27)

Control intervention: received rehabilitation in the outpatient therapy department. Exercises and ETNS were the same but the therapy was provided face-to-face with therapists.

1.1.21.3. Characteristics

1.1.21.3.1. Study-level characteristics

Characteristic	Study (N = 54)
Ethnicity Nominal	NR
Focus of care required Nominal	NR

1.1.21.3.2. Arm-level characteristics

Characteristic	Telerehabilitation (N = 27)	In person (N = 27)
% Female Sample size	n = 9 ; % = 33.3	n = 12 ; % = 44.4
Mean age (SD) Mean (SD)	66.52 (12.08)	66.15 (12.33)
Comorbidities Sample size	n = NR ; % = NR	n = NR ; % = NR
Hypertension Sample size	n = 21 ; % = 55.3	n = 25 ; % = 69.4
Hyperlipdaemia Sample size	n = 2 ; % = 5.2	n = 2 ; % = 5.6

Characteristic	Telerehabilitation (N = 27)	In person (N = 27)
Diabetes Sample size	n = 12 ; % = 31.6	n = 8 ; % = 22.2
Atrial fibrillation Sample size	n = 3 ; % = 7.9	n = 1 ; % = 2.8
Time period after stroke (days) Mean (SD)	24.96 (5.62)	26.85 (*empty data*)
Severity NIHSS Mean (SD)	6.78 (2.67)	7.7 (2.55)

1.1.21.4. Outcomes

1.1.21.4.1. Study timepoints

- Baseline
- 3 month
- 6 month

1.1.21.4.2. Continuous outcomes

Outcome	Telerehabilitation, Baseline, N = 27	Telerehabilitation, 3 month, N = 26	Telerehabilitation, 6 month, N = 26	In person, Baseline, N = 27	In person, 3 month, N = 25	In person, 6 month, N = 24
Activities of daily living (barthel index) Scale range: 0-100. Final values. Mean (SD)	55.56 (12.81)	61.4 (12.9)	67.31 (12.27)	54.26 (13.35)	59.8 (12.3)	66.04 (10.83)
Balance (Berg Balance Scale) Scale range: 0-56. Final values. Mean (SD)	33.1 (4)	37 (3.8)	40.5 (4.1)	31.7 (5.9)	36.1 (5.3)	39.5 (5.4)

Activities of daily living (barthel index) - Polarity - Higher values are better
Balance (Berg Balance Scale) - Polarity - Higher values are better

1.1.21.4.3. Continuous outcomes (mean differences)

Outcome	Telerehabilitation vs In person, Baseline, N2 = 27, N1 = 27	Telerehabilitation vs In person, 3 month, N2 = 26, N1 = 25	Telerehabilitation vs In person, 6 month, N2 = 26, N1 = 24
Activities of daily living (barthel index) Scale range: 0-100. Mean difference determined from final values. Mean (95% CI)	1.3 (-5.87 to 8.46)	2.08 (-5.17 to 9.34)	1.52 (-5.01 to 8.05)

Outcome	Telerehabilitation vs In person, Baseline, N2 = 27, N1 = 27	Telerehabilitation vs In person, 3 month, N2 = 26, N1 = 25	Telerehabilitation vs In person, 6 month, N2 = 26, N1 = 24
Balance (Berg Balance Scale) Scale range: 0-56. Mean difference determined from final values. Mean (95% CI)	1.37 (-0.93 to 3.67)	0.92 (-1.27 to 3.1)	0.65 (-1.43 to *empty data*)

Activities of daily living (barthel index) - Polarity - Higher values are better
Balance (Berg Balance Scale) - Polarity - Higher values are better

1.1.21.4.4. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.21.4.5. Continuousoutcomes(meandifferences)-Activitiesofdailyliving(barthelindex)-MeanNineFivePercentCI-Telerehabilitation-In person-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns
Overall bias and Directness	Overall Directness	Directly applicable

1.1.21.4.6. Continuousoutcomes(meandifferences)-Activitiesofdailyliving(barthelindex)-MeanNineFivePercentCI-Telerehabilitation-In person-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable

1.1.21.4.7. Continuousoutcomes(meandifferences)-Balance(BergBalanceScale)-MeanNineFivePercentCI-Telerehabilitation-In person-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns
Overall bias and Directness	Overall Directness	Directly applicable

1.1.21.4.8. Continuousoutcomes(meandifferences)-Balance(BergBalanceScale)-MeanNineFivePercentCI-Telerehabilitation-In person-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns
Overall bias and Directness	Overall Directness	Directly applicable

1.1.22. Chen, 2020

Bibliographic Reference	Chen, Jing; Sun, Dalong; Zhang, Shufan; Shi, Yonghui; Qiao, Fenglei; Zhou, Yafei; Liu, Jun; Ren, Chuancheng; Effects of home-based telerehabilitation in patients with stroke: A randomized controlled trial.; Neurology; 2020; vol. 95 (no. 17); e2318-e2330

1.1.22.1. Study details

Secondary publication of another included study- see primary study for details	No additional information.
Other publications associated with this study included in review	No additional information.
Trial name / registration number	NR
Study type	Randomised controlled trial (RCT)
Study location	China
Study setting	The neurology department of Shanghai Fifth People's Hospital affiliated with Fudan University and community setting
Study dates	NR
Sources of funding	This study was supported by Shanghai Strategic Emerging Industries Project Plan (2013SJXWQ52) and the National Natural Science Foundation of China (81571277).
Inclusion criteria	The inclusion criteria were as follows: (1) aged 30–85 years; (2) right-handed before stroke; (3) screening within 1–3 weeks after stroke symptom onset and in a stable condition; (4) first-onset stroke with a single subcortical lesion involving the motor pathway; (5) clinical evidence of hemiplegia based on neurologic examination, and the corresponding responsible lesions evident on CT or MRI; (6) NIH Stroke Scale (NIHSS) score 2–20; and (7) not receiving regular rehabilitation training but who have a strong need for rehabilitation and good family support.
Exclusion criteria	The exclusion criteria included the following: (1) unconsciousness, cognitive impairment, or cooperation difficulties; (2) cerebellar or pontine lesions; (3) other brain abnormalities or psychiatric disorders, or clinically significant or unstable medical diseases; (4) use of medications that might affect motor examinations, such as antipsychotics and antiepileptics; (5) contraindications for MRI scanning; and (6) claustrophobia

Recruitment / selection of participants	A consecutive series of patients with a diagnosis of stroke who were admitted to the neurology department of Shanghai Fifth People's Hospital affiliated with Fudan University between July 2017 and January 2019 were screened for inclusion by a consensus panel of 2 senior neurologists and 1 radiologist.
Intervention(s)	Home-based motor training telerehabilitation: Patients assigned to the TR group participated in rehabilitation training at home with the Telemedicine Rehabilitation System. (TRS) under the therapists' guidance. The TRS consists of a therapist end, a network data system, and a patient end. Therapists supervise the patients to conduct OT/PT and ENTS by live video conferencing via TRS. Concomitant therapy: All the patients were required to receive the rehabilitative intervention for up to 12 weeks after inclusion with a target of 10 rehabilitation training sessions per week with 60 minutes of occupational therapy (OT) and physical therapy (PT) and 20 minutes of EMG-triggered neuromuscular stimulation (ETNS) for each session.
Population subgroups	NR
Subgroup 1 - time after stroke	Subacute (7 days - 6 months)
Subgroup 2 - Severity	Moderate (or NIHSS 5-14)
Subgroup 3 - Minutes/hours of intervention per day	1-2 hours
Subgroup 4 - Number of days of treatment per week	5 days per week
Subgroup 5 - Focus of care	Upper limb Lower limb
Subgroup 6 - Mode of delivery	Videoconferencing

Subgroup 7 - Mode of feedback	Real time communication
Comparator	Conventional rehabilitation in person: Patients randomized to the CR group completed the rehabilitation training in the outpatient rehabilitation department and the training was conducted face-to-face with the rehabilitation therapists. Concomitant therapy: All the patients were required to receive the rehabilitative intervention for up to 12 weeks after inclusion with a target of 10 rehabilitation training sessions per week with 60 minutes of occupational therapy (OT) and physical therapy (PT) and 20 minutes of EMG-triggered neuromuscular stimulation (ETNS) for each session.
Number of participants	52
Duration of follow-up	12 weeks and 24 weeks
Indirectness	NR
Additional comments	NR

1.1.22.2. Study arms

1.1.22.2.1. Home-based motor training telerehabilitation (N = 26)

Patients assigned to the TR group participated in rehabilitation training at home with the Telemedicine Rehabilitation System. (TRS) under the therapists' guidance. The TRS consists of a therapist end, a network data system, and a patient end. Therapists supervise the patients to conduct OT/PT and ENTS by live video conferencing via TRS. Concomitant therapy: All the patients were required to receive the rehabilitative intervention for up to 12 weeks after inclusion with a target of 10 rehabilitation training sessions per week with 60 minutes of occupational therapy (OT) and physical therapy (PT) and 20 minutes of EMG-triggered neuromuscular stimulation (ETNS) for each session.

1.1.22.2.2. Conventional rehabilitation in person (N = 26)

Patients randomized to the CR group completed the rehabilitation training in the outpatient rehabilitation department and the training was conducted face-to-face with the rehabilitation therapists. Concomitant therapy: All the patients were required to receive the rehabilitative intervention for up to 12 weeks after inclusion with a target of 10 rehabilitation training sessions per week with 60 minutes of occupational therapy (OT) and physical therapy (PT) and 20 minutes of EMG-triggered neuromuscular stimulation (ETNS) for each session.

1.1.22.3. Characteristics

1.1.22.3.1. Study-level characteristics

Characteristic	**Study (N = 52)**
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Focus of care required Nominal	NR

1.1.22.3.2. Arm-level characteristics

Characteristic	**Home-based motor training telerehabilitation (N = 26)**	**Conventional rehabilitation in person (N = 26)**
% Female Sample size	n = 12 ; % = 46	n = 14 ; % = 53.8

Characteristic	Home-based motor training telerehabilitation (N = 26)	Conventional rehabilitation in person (N = 26)
Mean age (SD) Mean (SD)	64.19 (9.42)	59.42 (10)
Time period after stroke (days) Median (IQR)	14 (13 to 16)	14 (12.6 to 16)
Severity Median (IQR)	5 (3 to 6)	5 (3.8 to 8)

1.1.22.4. Outcomes

1.1.22.4.1. Study timepoints

- Baseline
- 12 week

1.1.22.4.2. Continuous outcomes

Outcome	Home-based motor training telerehabilitation, Baseline, N = 26	Home-based motor training telerehabilitation, 12 week, N = 22	Conventional rehabilitation in person, Baseline, N = 26	Conventional rehabilitation in person, 12 week, N = 22
Physical function - upper limb (FMA UE and LL) Scale range: 0-100. Change scores.	71.88 (10.76)	NA (NA)	71.65 (10.25)	NA (NA)

Outcome	Home-based motor training telerehabilitation, Baseline, N = 26	Home-based motor training telerehabilitation, 12 week, N = 22	Conventional rehabilitation in person, Baseline, N = 26	Conventional rehabilitation in person, 12 week, N = 22
Mean (SD)				
Activities of daily living (Modified Barthel Index) Scale range: 0-100. Change scores. Mean (SD)	70 (NR)	NA (NA)	77.5 (NR)	NA (NA)

Physical function - upper limb (FMA UE and LL) - Polarity - Higher values are better
Activities of daily living (Modified Barthel Index) - Polarity - Higher values are better

1.1.22.4.3. Dichotomous outcomes

Outcome	Home-based motor training telerehabilitation, Baseline, N = 26	Home-based motor training telerehabilitation, 12 week, N = 26	Conventional rehabilitation in person, Baseline, N = 26	Conventional rehabilitation in person, 12 week, N = 26
Withdrawal due to adverse events died No of events	n = NR ; % = NR	n = 1 ; % = 3.8	n = NR ; % = NR	n = 2 ; % = 7.7

Withdrawal due to adverse events - Polarity - Lower values are better

1.1.22.4.4. Continuous outcomes (mean differences)

Outcome	Home-based motor training telerehabilitation vs Conventional rehabilitation in person, Baseline, N2 = 26, N1 = 26	Home-based motor training telerehabilitation vs Conventional rehabilitation in person, 12 week, N2 = 22, N1 = 22
Physical function - upper limb (FMA UE and LL) Scale range: 0-100. Change scores. Mean (95% CI)	NA (NA to NA)	5.81 (0.076 to 7.46)
Activities of daily living (Modified Barthel Index) Scale range: 0-100. Change scores. Mean (95% CI)	NA (NA to NA)	5.58 (-0.0856 to 11.1)

Physical function - upper limb (FMA UE and LL) - Polarity - Higher values are better
Activities of daily living (Modified Barthel Index) - Polarity - Higher values are better

1.1.22.4.5. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.22.4.6. Dichotomousoutcomes-Withdrawalduetoadverseevents-NoOfEvents-Home-based motor training telerehabilitation-Conventional rehabilitation in person-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable

1.1.22.4.7. Continuousoutcomes(meandifferences)-Physicalfunction-upperlimb(FMAUEandLL)-MeanNineFivePercentCI-Home-based motor training telerehabilitation-Conventional rehabilitation in person-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns
Overall bias and Directness	Overall Directness	Partially applicable *(Outcome indirectness (reports upper limb and lower limb scales pooled together instead of just the upper limb subscale))*

1.1.22.4.8. Continuousoutcomes(meandifferences)-Activitiesofdailyliving(ModifiedBarthelIndex)-MeanNineFivePercentCI-Home-based motor training telerehabilitation-Conventional rehabilitation in person-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns
Overall bias and Directness	Overall Directness	Directly applicable

1.1.23. Chumbler, 2012

Bibliographic Reference Chumbler, Neale R; Quigley, Patricia; Li, Xinli; Morey, Miriam; Rose, Dorian; Sanford, Jon; Griffiths, Patricia; Hoenig, Helen; Effects of telerehabilitation on physical function and disability for stroke patients: a randomized, controlled trial.; Stroke; 2012; vol. 43 (no. 8); 2168-74

1.1.23.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	This paper was included in the Cochrane review that this review was based on: Laver KE, Adey-Wakeling Z, Crotty M, Lannin NA, George S, Sherrington C. Telerehabilitation services for stroke. Cochrane Database of Systematic Reviews 2020, Issue 1. Art. No.: CD010255. For further information about the data extraction please see the Cochrane review.
Trial name / registration number	NCT00384748
Study type	Randomised controlled trial (RCT)
Study location	USA
Study setting	Recruited from 3 Veterans Affairs Medical Centres in the USA
Study dates	NR
Sources of funding	This research was supported by the Department of Veteran Affairs Rehabilitation Research and Development Service (B4492R).

	N.R.C. discloses a research grant from the VA Office of Rural Health for >$10 000. No potential conflicts of interest exist for the remaining authors.
Inclusion criteria	Inclusion criteria: ischemic or haemorrhagic stroke within the previous 24 months; participants aged 45 to 90 years, discharged to the community, not cognitively impaired (no more than 4 errors on the Short Portable Mental Status Questionnaire), able to follow a 3-step command, discharge motor Functional Independence Measure score of 18 to 88, approval by participants and physician; signed medical media release form
Exclusion criteria	Exclusion criteria: failure to meet above criteria
Recruitment / selection of participants	Recruited from 3 Veterans Affairs Medical Centres in the USA
Intervention(s)	Telerehabilitation intervention: the purpose of the intervention was to improve the participant's func tional mobility. Intervention included 3 tele-visits, use of an in-home messaging device (IHMD) and 5 telephone calls over a 3-month period. The tele-visits involved assessment of physical function, goal setting and demonstration of exercises; a research assistant used a camcorder to record the home environment and the participant completing tests of physical and functional performance that were later reviewed by the teletherapist. The therapist asked the participant questions via the IHMD and provided positive encouragement to maximise exercise adherence. Telephone calls were used to problem-solve any barriers to exercise and to review and advance the exercise programmes.
Population subgroups	NR
Subgroup 1 - time after stroke	Subacute (7 days - 6 months)
Subgroup 2 - Severity	Moderate (or NIHSS 5-14)
Subgroup 3 - Minutes/hours of intervention per day	1-2 hours

Subgroup 4 - Number of days of treatment per week	<5 days a week
Subgroup 5 - Focus of care	Functional independency
Subgroup 6 - Mode of delivery	Telephone
Subgroup 7 - Mode of feedback	Store and forward
Comparator	Participants randomized to the UC group were not contacted by study personnel other than for the initial recruitment and consent, and to obtain baseline and outcome measures. The UC participants could receive any services provided as part of their usual VA or non-VA care, such as home health care.
Number of participants	48
Duration of follow-up	3 months and 6 months
Indirectness	NR
Additional comments	NR

1.1.23.2. Study arms

1.1.23.2.1. Telerehabilitation arm (N = 25)

Telerehabilitation intervention: the purpose of the intervention was to improve the participant's functional mobility. Intervention included 3 tele-visits, use of an in-home messaging device (IHMD) and 5 telephone calls over a 3-month period. The tele-visits involved assessment of physical function, goal setting and demonstration of exercises; a research assistant used a camcorder to record the home environment and the participant completing tests of physical and functional performance that were later reviewed by the teletherapist. The therapist asked the participant questions via the IHMD and provided positive encouragement to maximise exercise

adherence. Telephone calls were used to problem-solve any barriers to exercise and to review and advance the exercise programmes.

1.1.23.2.2. Usual care (N = 23)

Participants randomized to the UC group were not contacted by study personnel other than for the initial recruitment and consent, and to obtain baseline and outcome measures. The UC participants could receive any services provided as part of their usual VA or non-VA care, such as home health care.

1.1.23.3. Characteristics

1.1.23.3.1. Study-level characteristics

Characteristic	**Study (N = 48)**
% Female Sample size	n = 0 ; % = 0
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Focus of care required Nominal	NR

1.1.23.3.2. Arm-level characteristics

Characteristic	Telerehabilitation arm (N = 25)	Usual care (N = 23)
Mean age (SD) Mean (SD)	67.1 (9.5)	67.7 (10)
Time period after stroke days Median (IQR)	26 (41 to 50)	74 (31 to 49)
Severity Goldstein and Chilukuri algorithm of the Canadian Neurological Scale Mean (SD)	6.7 (1.3)	6.8 (1.4)

1.1.23.4. Outcomes

1.1.23.4.1. Study timepoints

- Baseline
- 3 month
- 6 month

1.1.23.4.2. Continuous outcomes

Outcome	Telerehabilitation arm, Baseline, N = 25	Telerehabilitation arm, 3 month, N = 22	Telerehabilitation arm, 6 month, N = 24	Usual care, Baseline, N = 23	Usual care, 3 month, N = 22	Usual care, 6 month, N = 19
Physical function - upper limb - Late-Life Function	64.7 (21.2)	70.1 (19.4)	72.2 (20.6)	65.6 (17.2)	64.1 (17.8)	64.3 (19.3)

Outcome	Telerehabilitation arm, Baseline, N = 25	Telerehabilitation arm, 3 month, N = 22	Telerehabilitation arm, 6 month, N = 24	Usual care, Baseline, N = 23	Usual care, 3 month, N = 22	Usual care, 6 month, N = 19
and Disability Instrument 0-100 (values reported in cochrance) Mean (SD)						

Physical function - upper limb - Late-Life Function and Disability Instrument - Polarity - Higher values are better

1.1.23.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.23.4.4. Continuousoutcomes-Physicalfunction-upperlimb-Late-LifeFunctionandDisabilityInstrument-MeanSD-Telerehabilitation arm-Usual care-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low
Overall bias and Directness	Overall Directness	Directly applicable

1.1.23.4.5. Continuousoutcomes-Physicalfunction-upperlimb-Late-LifeFunctionandDisabilityInstrument-MeanSD-Telerehabilitation arm-Usual care-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(greater attrition rate in the control arm)*

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable

1.1.24. Cramer, 2019

Bibliographic Reference Cramer, Steven C; Dodakian, Lucy; Le, Vu; See, Jill; Augsburger, Renee; McKenzie, Alison; Zhou, Robert J; Chiu, Nina L; Heckhausen, Jutta; Cassidy, Jessica M; Scacchi, Walt; Smith, Megan Therese; Barrett, A M; Knutson, Jayme; Edwards, Dylan; Putrino, David; Agrawal, Kunal; Ngo, Kenneth; Roth, Elliot J; Tirschwell, David L; Woodbury, Michelle L; Zafonte, Ross; Zhao, Wenle; Spilker, Judith; Wolf, Steven L; Broderick, Joseph P; Janis, Scott; National Institutes of Health StrokeNet Telerehab, Investigators; Efficacy of Home-Based Telerehabilitation vs In-Clinic Therapy for Adults After Stroke: A Randomized Clinical Trial.; JAMA neurology; 2019; vol. 76 (no. 9); 1079-1087

1.1.24.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	This paper was included in the Cochrane review that this review was based on: Laver KE, Adey-Wakeling Z, Crotty M, Lannin NA, George S, Sherrington C. Telerehabilitation services for stroke. Cochrane Database of Systematic Reviews 2020, Issue 1. Art. No.: CD010255. For further information about the data extraction please see the Cochrane review.
Trial name / registration number	NCT02360488
Study type	Randomised controlled trial (RCT)

Study location	USA
Study setting	11 sites in USA and home based
Study dates	NR
Sources of funding	This award was funded by the Eunice Kennedy Shriver National Institute of Child Health and Human Development as well as grants U01 NS091951, K24 HD074722, and T32 AR047752 from the NINDS.
Inclusion criteria	Inclusion criteria: age ≥ 18 years, stroke onset 4 to 36 weeks prior, arm motor Fugl-Meyer score 22-56 (out of 66)
Exclusion criteria	Exclusion criteria: major active coexistent neurological or psychiatric disease; severe depression, cognitive impairment (MoCA < 22), communication deficits interfering with participation, life expectancy < 6 months, non-English speaking, unable to perform the 3 rehabilitation exercise test examples
Recruitment / selection of participants	Recruited from: 11 sites in the USA
Intervention(s)	Telerehabilitation therapy - The treatment intervention consisted of internet-enabled computer with table, chair, and 12 gaming input devices, but no keyboard, as no computer operation was required by patients. System software supported videoconferencing and organized the 70 minutes of therapy, which consisted of exercises, functional games, and stroke education as described in “For Both Groups.” Patients were trained to use the TR system at the baseline visit. A study team member delivered the TR system to the home, where all 36 sessions took place. During the 30 minutes prior to each session, the computer alerted the patient to the start time. Patients pressed a tabletop button to begin the session, and to start subsequent games and exercises. Supervised sessions began with a 30-minute patient-therapist videoconference, during which therapists supervised therapy, answered questions, reviewed treatment plans, and performed study assessments. Unsupervised sessions had the same treatment content as supervised sessions but without therapist contact. Exercises and stroke education in the TR group were strictly matched to IC group content, being presented via the TR system. Concomitant therapy - After discharge, participants in both groups were given physical exercises and electromyography-triggered neuromuscular stimulation (ETNS). Exercises were conducted for 1 hour, twice in a working day for 12 weeks (total = 60 sessions). ETNS was conducted by using a portable muscle electricity biofeedback instrument for 20 minutes, twice in a working day for 12 weeks, a total of 60 sessions.

Population subgroups	NR
Subgroup 1 - time after stroke	Subacute (7 days - 6 months)
Subgroup 2 - Severity	Mild (or NIHSS 1-5)
Subgroup 3 - Minutes/hours of intervention per day	≤45 minutes
Subgroup 4 - Number of days of treatment per week	6 days a week
Subgroup 5 - Focus of care	Upper limb
Subgroup 6 - Mode of delivery	Videoconferencing
Subgroup 7 - Mode of feedback	Real time communication
Comparator	In clinic intervention -The 18 supervised treatment sessions took place at the research center, during which treatment therapists provided 70 minutes of continuous supervision. The 18 unsupervised treatment sessions were at home, guided by an individualized booklet created and printed by treatment therapists and containing diagrams and instructions for functional tasks plus exercises from the same list available during supervised days.
Number of participants	124
Duration of follow-up	30 day
Indirectness	NR

Additional comments	NR

1.1.24.2. Study arms

1.1.24.2.1. Telerehabilitation arm motor therapy (N = 62)

1.1.24.2.2. In person arm motor therapy (N = 62)

1.1.24.3. Characteristics

1.1.24.3.1. Study-level characteristics

Characteristic	**Study (N = 124)**
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Focus of care required Nominal	NR

1.1.24.3.2. Arm-level characteristics

Characteristic	Telerehabilitation arm motor therapy (N = 62)	In person arm motor therapy (N = 62)
% Female Sample size	n = 14 ; % = 22.6	n = 20 ; % = 32.3
Mean age (SD) Mean (SD)	62 (14)	62 (13)
Time period after stroke Mean (SD)	132 (65)	129 (59)
Severity Median (IQR)	3 (2 to 5)	3 (2 to 4)

1.1.24.4. Outcomes

1.1.24.4.1. Study timepoints

- Baseline
- 30 day

1.1.24.4.2. Continuous outcomes

Outcome	Telerehabilitation arm motor therapy, Baseline, N = 62	Telerehabilitation arm motor therapy, 30 day, N = 62	In person arm motor therapy, Baseline, N = 62	In person arm motor therapy, 30 day, N = 62
Physical function – upper limb - FM UE - chnage	NR (NR)	7.9 (6.7)	NR (NR)	8.4 (7)

Outcome	Telerehabilitation arm motor therapy, Baseline, N = 62	Telerehabilitation arm motor therapy, 30 day, N = 62	In person arm motor therapy, Baseline, N = 62	In person arm motor therapy, 30 day, N = 62
score 0-66 reported in cochrane Mean (SD)				

Physical function – upper limb - FM UE - chnage score - Polarity - Higher values are better

1.1.24.4.3. Continuous outcome (mean difference)

Outcome	Telerehabilitation arm motor therapy vs In person arm motor therapy, Baseline, N2 = 62, N1 = 62	Telerehabilitation arm motor therapy vs In person arm motor therapy, 30 day, N2 = 62, N1 = 62
Physical function - upper limb (Fugl Meyer upper limb) Scale range: 0-66. Adjusted mean difference. Mean (95% CI)	NA (NA to NA)	0.06 (-2.14 to 2.26)

Physical function - upper limb (Fugl Meyer upper limb) - Polarity - Higher values are better

1.1.24.4.4. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.24.4.5. Continuousoutcome(meandifference)-Physicalfunction-upperlimb(FuglMeyerupperlimb)-MeanNineFivePercentCI-Telerehabilitation arm motor therapy-In person arm motor therapy-t30

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable

1.1.25. Dawson, 2022

Bibliographic Reference	Dawson, D.R.; Anderson, N.D.; Binns, M.; Bar, Y.; Chui, A.; Gill, N.; Linkewich, E.; McEwen, S.; Nalder, E.; Skidmore, E.; Strategy-training post-stroke via tele-rehabilitation: a pilot randomized controlled trial; Disability and rehabilitation; 2022; 1-10

1.1.25.1. Study details

Secondary publication of another included study- see primary study for details	No additional information.
Other publications associated with this study included in review	No additional information.
Trial name / registration number	NCT02724813.
Study type	Randomised controlled trial (RCT)
Study location	Canada
Study setting	Community-based.
Study dates	No additional information.

Sources of funding	Supported by a grant from the Heart & Stroke Foundation, Canadian Partnership for Stroke Recovery to DD.
Inclusion criteria	At least 6 months post stroke (to allow examination of the effects of the intervention separately from the spontaneous recovery that can occur in acute/post-acute stroke); have access to a computer and high-speed internet; fluent in written and spoken English and no severe aphasia; impaired on one or more of the five items of the Executive Interview (those that could be administered via telephone, specifically saying alternating numbers and letters, word fluency, anomalous sentence repetition, a memory/distraction test and a serial order reversal task); score below the dementia cut-off (<30) on the Telephone Interview of Cognitive Status; no other neurological conditions; report no concurrent substance abuse; able to self-identify specific areas of their everyday lives with which they were having difficulty and needed or wanted to improve.
Exclusion criteria	Signs of depression on the Patient Health Questionnaire-9 (score >9).
Recruitment / selection of participants	Recruited through advertisements at collaborating stroke centers across Ontario and from a volunteer research participant database at Baycrest Health Sciences, Toronto, Canada.
Intervention(s)	Telerehabilitation N=8 Tele-CO-OP service delivered over a 10-week period by licensed occupational therapists delivered via Skype and recorded using Pamela for Skype. All people received information about the platform and research assistants provided assistance to setup the software. The sessions were recorded to allowed facilitators to engage in discussions about the sessions with a trained instructor to support treatment fidelity. The CO-OP approach included the elements of client-selected goals, application of meta-cognitive strategy, collaborative analysis of barriers to goal attainment, guided discovery toward goal attainment and promotion of learning and generalisation by the therapist through direct discussion concerning the application of strategies in a wide variety of everyday situations. Concomitant therapy: Typically no active rehabilitation. Four reported current attendance at physiotherapy programs for exercise, two once a week, one twice a week, one starting a program within the next month. Three of these people were in the intervention group.
Population subgroups	No additional information.
Subgroup 1 - time after stroke	Chronic (>6 months)

Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	Unclear/not stated
Subgroup 4 - Number of days of treatment per week	Unclear/not stated
Subgroup 5 - Focus of care	Functional independency
Subgroup 6 - Mode of delivery	Videoconferencing
Subgroup 7 - Mode of feedback	Real time communication
Comparator	Usual care N=9 Treatment as usual. Concomitant therapy: Typically no active rehabilitation. Four reported current attendance at physiotherapy programs for exercise, two once a week, one twice a week, one starting a program within the next month. Three of these people were in the intervention group.
Number of participants	17
Duration of follow-up	10 weeks, 15 weeks (1 month after the end of intervention). However, the control group received the intervention at this time and so only the 10 week data will be extracted.
Indirectness	No additional information.

Additional comments	Intention to treat (1 dropped out from the control group but all people included in the analysis in their intended group).

1.1.25.2. Study arms

1.1.25.2.1. Telerehabilitation (N = 8)

Tele-CO-OP service delivered over a 10-week period by licensed occupational therapists delivered via Skype and recorded using Pamela for Skype. All people received information about the platform and research assistants provided assistance to setup the software. The sessions were recorded to allowed facilitators to engage in discussions about the sessions with a trained instructor to support treatment fidelity. The CO-OP approach included the elements of client-selected goals, application of meta-cognitive strategy, collaborative analysis of barriers to goal attainment, guided discovery toward goal attainment and promotion of learning and generalisation by the therapist through direct discussion concerning the application of strategies in a wide variety of everyday situations. Concomitant therapy: Typically no active rehabilitation. Four reported current attendance at physiotherapy programs for exercise, two once a week, one twice a week, one starting a program within the next month. Three of these people were in the intervention group.

1.1.25.2.2. Usual care (N = 9)

Treatment as usual (received the intervention after 10 weeks). Concomitant therapy: Typically no active rehabilitation. Four reported current attendance at physiotherapy programs for exercise, two once a week, one twice a week, one starting a program within the next month. Three of these people were in the intervention group.

1.1.25.3. Characteristics

1.1.25.3.1. Arm-level characteristics

Characteristic	Telerehabilitation (N = 8)	Usual care (N = 9)
% Female	n = 4 ; % = 50	n = 4 ; % = 44

Characteristic	Telerehabilitation (N = 8)	Usual care (N = 9)
Sample size		
Mean age (SD) (years) Mean (SD)	54.75 (11.78)	63.33 (12)
Ethnicity Sample size	n = NR ; % = NR	n = NR ; % = NR
Comorbidities Sample size	n = NR ; % = NR	n = NR ; % = NR
Time period after stroke (years) Mean (SD)	9.54 (8.48)	8.17 (8.93)
Severity Sample size	n = NR ; % = NR	n = NR ; % = NR
Focus of care required Sample size	n = NR ; % = NR	n = NR ; % = NR

1.1.25.4. Outcomes

1.1.25.4.1. Study timepoints

- Baseline
- 10 week (<6 months)

1.1.25.4.2. Continuous outcomes

Outcome	Telerehabilitation, Baseline, N = 8	Telerehabilitation, 10 week, N = 8	Usual care, Baseline, N = 9	Usual care, 10 week, N = 9
Activities of daily living (COPM) Scale range: 1-10. Change scores. Mean (SD)	NA (NA)	NA (NA)	NA (NA)	NA (NA)
COPM performance untrained Scale range: 1-10. Change scores. Mean (SD)	4 (1.93)	2.38 (2.45)	4.69 (1.49)	1.88 (1.19)
COPM satisfaction untrained Scale range: 1-10. Change scores. Mean (SD)	4.15 (1.66)	2.69 (2.89)	4.71 (2.2)	1.67 (1.32)
Psychological distress - Depression (PHQ-9) Scale range: 0-27. Change scores. Mean (SD)	3 (3.38)	-1.25 (2.12)	4.13 (3)	-1.63 (2)

Activities of daily living (COPM) - Polarity - Higher values are better
Psychological distress - Depression (PHQ-9) - Polarity - Lower values are better

1.1.25.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.25.4.4. Continuousoutcomes-Activitiesofdailyliving(COPM)-COPMperformanceuntrained-MeanSD-Telerehabilitation-Usual care-t10

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns
Overall bias and Directness	Overall Directness	Directly applicable

1.1.25.4.5. Continuousoutcomes-Activitiesofdailyliving(COPM)-COPMsatisfactionuntrained-MeanSD-Telerehabilitation-Usual care-t10

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns
Overall bias and Directness	Overall Directness	Directly applicable

1.1.25.4.6. Continuousoutcomes-Psychologicaldistress-Depression(PHQ-9)-MeanSD-Telerehabilitation-Usual care-t10

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns
Overall bias and Directness	Overall Directness	Directly applicable

1.1.26. De Luca, 2018

Bibliographic Reference	De Luca, Rosaria; Leonardi, Simona; Spadaro, Letteria; Russo, Margherita; Aragona, Bianca; Torrisi, Michele; Maggio, Maria Grazia; Bramanti, Alessia; Naro, Antonino; De Cola, Maria Cristina; Calabro, Rocco Salvatore; Improving Cognitive Function in Patients with Stroke: Can Computerized Training Be the Future?.; Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association; 2018; vol. 27 (no. 4); 1055-1060

1.1.26.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	NR
Trial name / registration number	NR
Study type	Randomised controlled trial (RCT)
Study location	Italy
Study setting	Laboratory of Robotic and Cognitive Rehabilitation of Istituto di Ricerca e Cura a Carattere Scientifico Neurolesi in Messina
Study dates	NR
Sources of funding	NR
Inclusion criteria	Inclusion criteria were (1) diagnosis of vascular brain injury of either hemorrhagic or ischemic etiology (the latter involving the middle cerebral artery); (2) presence of moderate cognitive impairment, that is, Mini-Mental State Examination (MMSE) score ranging from 12 to 20; (3) absence of severe spasticity with an Ashworth Scale less than 3; (4) absence of disabling

	sensory alterations (i.e., hearing and visual loss), and of severe medical and psychiatric illness according to the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) and International Classification of Diseases-10.
Exclusion criteria	NR
Recruitment / selection of participants	The sample was enrolled from January 2013 to May 2015 at the Laboratory of Robotic and Cognitive Rehabilitation of Istituto di Ricerca e Cura a Carattere Scientifico Neurolesi of Messina.
Intervention(s)	All the study participants underwent the same traditional CR, 6 times a week for 8 weeks (i.e., 48 sessions of 45 minutes each). In addition, the EG was submitted to the pc-based Erica training, consisting of 24 sessions of 45 minutes each, 3 times a week for 8 weeks, whereas the CG performed only CR (24 sessions, 3 times a week for 8 weeks). Pc-cognitive training was realized by means of an Italian computerized cognitive tool, Erica (with a user license of 3 years; www.erica.giunti.it), which consists of a number of personalized pc exercises, articulated in 5 specific cognitive domains: attention process, memory abilities, spatial cognition, verbal and nonverbal executive functions. This platform of neuropsychological rehabilitation is characterised by modularity, flexibility, and uniformity in the type of task and in the administered program. A trained cognitive therapist provided exercises with a growing hierarchy of complexity through the Erica rehabilitative platform: the exercises' difficulty was flexible to the progressive changes of the patient's performance, and consistently ensured effective and pleasant rehabilitation sessions. Concomitant therapy: All the study participants underwent the same traditional CR, 6 times a week for 8 weeks (i.e., 48 sessions of 45 minutes each). To summarize, the 2 groups were submitted to the same amount of neurorehabilitation, but only the EG performed computerized cognitive rehabilitation.
Population subgroups	NR
Subgroup 1 - time after stroke	Subacute (7 days - 6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of	≤45 minutes

intervention per day	
Subgroup 4 - Number of days of treatment per week	5 days per week
Subgroup 5 - Focus of care	Cognition
Subgroup 6 - Mode of delivery	Unclear
Subgroup 7 - Mode of feedback	Store and forward
Comparator	Control rehabilitation consisted in a face-to-face approach between the patient and the therapist that was administered in individual sessions. Training was customized for the needs of each patient. Indeed, tasks were presented using a paper and-pencil modality, and these were specifically built to stimulate specific cognitive skill. Concomitant therapy: All the study participants underwent the same traditional CR, 6 times a week for 8 weeks (i.e., 48 sessions of 45 minutes each). To summarize, the 2 groups were submitted to the same amount of neurorehabilitation, but only the EG performed computerized cognitive rehabilitation.
Number of participants	35
Duration of follow-up	16 weeks
Indirectness	NR
Additional comments	NR

1.1.26.2. Study arms

1.1.26.2.1. Computerized cognitive rehabilitation (N = 20)

All the study participants underwent the same traditional CR, 6 times a week for 8 weeks (i.e., 48 sessions of 45 minutes each). In addition, the EG was submitted to the pc-based Erica training, consisting of 24 sessions of 45 minutes each, 3 times a week for 8 weeks, whereas the CG performed only CR (24 sessions, 3 times a week for 8 weeks). Pc-cognitive training was realized by means of an Italian computerized cognitive tool, Erica (with a user license of 3 years; www.erica.giunti.it), which consists of a number of personalized pc exercises, articulated in 5 specific cognitive domains: attention process, memory abilities, spatial cognition, verbal and nonverbal executive functions. This platform of neuropsychological rehabilitation is characterised by modularity, flexibility, and uniformity in the type of task and in the administered program. A trained cognitive therapist provided exercises with a growing hierarchy of complexity through the Erica rehabilitative platform: the exercises' difficulty was flexible to the progressive changes of the patient's performance, and consistently ensured effective and pleasant rehabilitation sessions. Concomitant therapy: All the study participants underwent the same traditional CR, 6 times a week for 8 weeks (i.e., 48 sessions of 45 minutes each). To summarize, the 2 groups were submitted to the same amount of neurorehabilitation, but only the EG performed computerized cognitive rehabilitation.

1.1.26.2.2. Control rehabilitation (N = 15)

Control rehabilitation consisted in a face-to-face approach between the patient and the therapist that was administered in individual sessions. Training was customized for the needs of each patient. Indeed, tasks were presented using a paper and-pencil modality, and these were specifically built to stimulate specific cognitive skill. Concomitant therapy: All the study participants underwent the same traditional CR, 6 times a week for 8 weeks (i.e., 48 sessions of 45 minutes each). To summarize, the 2 groups were submitted to the same amount of neurorehabilitation, but only the EG performed computerized cognitive rehabilitation.

1.1.26.3. Characteristics

1.1.26.3.1. Study-level characteristics

Characteristic	**Study (N = 35)**
Ethnicity Nominal	NR

Characteristic	Study (N = 35)
Comorbidities Nominal	NR
Severity Nominal	NR
Focus of care required Nominal	NR

1.1.26.3.2. Arm-level characteristics

Characteristic	Computerized cognitive rehabilitation (N = 20)	Control rehabilitation (N = 15)
% Female Sample size	n = 9 ; % = 45	n = 8 ; % = 53.3
Mean age (SD) Mean (SD)	43.9 (16.6)	42.1 (17.7)
Time period after stroke Mean (SD)	3 (1)	4 (1)

1.1.26.4. Outcomes

1.1.26.4.1. Study timepoints

- Baseline

- 16 week

1.1.26.4.2. Continuous outcomes

Outcome	Computerized cognitive rehabilitation, Baseline, N = 20	Computerized cognitive rehabilitation, 16 week, N = 20	Control rehabilitation, Baseline, N = 15	Control rehabilitation, 16 week, N = 15
Cognition - Non-spatial attention and working memory (attentive matrices) Scale range unclear. Final values. Mean (SD)	29.6 (15.1)	43.1 (10.6)	35.3 (14)	37.7 (12)
Cognition - Non-spatial attention and working memory (digital span) Scale range unclear. Final values. Mean (SD)	3.4 (1.6)	3.9 (1.6)	3.7 (1.2)	4.3 (9)
Psychological distress (Hamilton Rating Scale for Depression) Scale range: 0-56. Final values. Mean (SD)	12.1 (6.5)	8.6 (4.6)	10.8 (5.2)	9.2 (4.5)

Cognition - Non-spatial attention and working memory (attentive matrices) - Polarity - Higher values are better
Cognition - Non-spatial attention and working memory (digital span) - Polarity - Higher values are better
Psychological distress (Hamilton Rating Scale for Depression) - Polarity - Lower values are better

1.1.26.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.26.4.4. Continuousoutcomes-Cognition-Non-spatialattentionandworkingmemory-attentivematrices-MeanSD-Computerized cognitive rehabilitation-Control rehabilitation-t16

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.26.4.5. Continuousoutcomes-psychologicaldistress-HamiltonRatingScaleforDepression-MeanSD-Computerized cognitive rehabilitation-Control rehabilitation-t16

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.26.4.6. Continuousoutcomes-cognition-Non-spatialattentionandworkingmemory-digitalspan-MeanSD-Computerized cognitive rehabilitation-Control rehabilitation-t16

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.27. Gauthier, 2022

Bibliographic Reference	Gauthier, Lynne V; Nichols-Larsen, Deborah S; Uswatte, Gitendra; Strahl, Nancy; Simeo, Marie; Proffitt, Rachel; Kelly, Kristina; Crawfis, Roger; Taub, Edward; Morris, David; Lowes, Linda Pax; Mark, Victor; Borstad, Alexandra; Video game rehabilitation for outpatient stroke (VIGoROUS): A multi-site randomized controlled trial of in-home, self-managed, upper-extremity therapy.; EClinicalMedicine; 2022; vol. 43; 101239

1.1.27.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	NR
Trial name / registration number	VIGoROUS trial
Study type	Randomised controlled trial (RCT)
Study location	USA, The Ohio State University, Missouri University, Providence Medford Medical Center, University of Alabama Birmingham, and OhioHealth.
Study setting	Community based and outpatient community rehabilitation centres
Study dates	Feb 2016 through May 2019
Sources of funding	The Patient-Centered Outcomes Research Institute (PCORI, AD-1409 −20772), financially supported this research. Additional support for participant recruitment and regulatory affairs was provided by the Center for Clinical and Translational Sciences (National Center for Advancing Translational Sciences, Grant #8UL1TR000090−05).

Inclusion criteria	Active range of motion criteria included > 10° in at least 2 fingers, thumb, and wrist; > 45° shoulder abduction and flexion; > 20° elbow extension. Eligible participants were adults who had experienced a stroke of any etiology at least 6 months prior to enrollment, were able to provide informed written consent, and were able/willing to commit to whichever three-week treatment protocol they were randomized to.
Exclusion criteria	NR
Recruitment / selection of participants	
Intervention(s)	This group received 4 visits (5 h) over 3 weeks of in-clinic one-on-one treatment with a therapist. Therapy visits had an almost exclusive emphasis on behavioral intervention. Behavioral interventions included identifying treatment goals that are personally meaningful, motivational interviewing to reinforce commitment to habit change, recording use of the paretic arm for each of the listed component tasks between therapy visits (self-monitoring), reviewing this list during each treatment session to promote accountability, additional self-monitoring/feedback via informal administration of the Motor Activity Log, and guided problem-solving to overcome barriers to using the paretic arm. To further develop capacity to perform specific tasks related to their treatment goals, participants independently practiced goal-directed tasks for 30 min on 10 separate days between therapy visits. The Tele-Gaming group received 6 additional brief behavioral video-consultations, totaling 2¢6 h, between clinic visits. Video-consultations focused primarily on problem-solving around barriers to using the paretic arm during daily life. New low-cost commercially available (Games That Move You, PBC) interactive video gaming technology provided engaging self-managed home practice. Gaming groups were provided with a gaming system at the initial visit. They were prescribed 15 h of unsupervised game play driven by movements of the paretic arm. All participants received a balanced upper extremity program consisting of all of the following in-game movements, executed both separately and in combination: shoulder flexion/extension, shoulder abduction, horizontal shoulder adduction across midline, elbow flexion/extension, forearm supination, grasp/release, finger flexion/extension and thumb abduction/adduction, wrist extension, and targeted reaching. Therapists could customize the relative balance of shoulder, elbow, wrist, and hand movements through the game’s user interface to suit the needs/goals of each participant. An additional self gaming intervention was included in the study but this intervention was not included in the review as it did not fit the protocol.
Population subgroups	NR

Subgroup 1 - time after stroke	Chronic (>6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	1-2 hours
Subgroup 4 - Number of days of treatment per week	7 days a week
Subgroup 5 - Focus of care	Upper limb Mixed (including multidisciplinary packages of care)
Subgroup 6 - Mode of delivery	Videoconferencing
Subgroup 7 - Mode of feedback	Real time communication
Comparator	Traditional therapy involved the same frequency and duration of in clinic treatment as the gaming group (5 h, 4 visits), with a traditional focus on motor training. Sessions involved neuromuscular reeducation, functional training, progressive strengthening, teaching a home program, and rest as needed to maintain a target for exercise intensity of 4 (somewhat hard) on the Borg CR10 Rating of Perceived Exertion Scale. A self-managed home program consisted of 15 min of strengthening exercises twice daily on the first 10 non-treatment days, to mirror the intensity and type of home practice that is routinely prescribed in standard clinical practice. The duration of home practice for the Traditional group also matched the time that the gaming groups spent on behavioral home practice. Visual aids (e.g., booklet of printed exercises) and typical therapy supplies (e.g., Theraband) were provided to participants to assist them in carrying out their home programs. An additional comparator group was included in this study which consisted of constraint induced movement therapy, however, this did not fit the protocol so this treatment arm was included in the review.

Number of participants	83
Duration of follow-up	3 weeks and 6 months
Indirectness	NR
Additional comments	NR

1.1.27.2. Study arms

1.1.27.2.1. Tele-Gaming (N = 45)

This group received 4 visits (5 h) over 3 weeks of in-clinic one-on-one treatment with a therapist. Therapy visits had an almost exclusive emphasis on behavioral intervention. Behavioral interventions included identifying treatment goals that are personally meaningful, motivational interviewing to reinforce commitment to habit change, recording use of the paretic arm for each of the listed component tasks between therapy visits (self-monitoring), reviewing this list during each treatment session to promote accountability, additional self-monitoring/feedback via informal administration of the Motor Activity Log, and guided problem-solving to overcome barriers to using the paretic arm. To further develop capacity to perform specific tasks related to their treatment goals, participants independently practiced goal-directed tasks for 30 min on 10 separate days between therapy visits. The Tele-Gaming group received 6 additional brief behavioral video-consultations, totaling 2¢6 h, between clinic visits. Video-consultations focused primarily on problem-solving around barriers to using the paretic arm during daily life.

1.1.27.2.2. Traditional motor-focused rehabilitation (N = 38)

Traditional therapy involved the same frequency and duration of in clinic treatment as the gaming group (5 h, 4 visits), with a traditional focus on motor training. Sessions involved neuromuscular reeducation, functional training, progressive strengthening, teaching a home program, and rest as needed to maintain a target for exercise intensity of 4 (somewhat hard) on the Borg CR10 Rating of Perceived Exertion Scale. A self-managed home program consisted of 15 min of strengthening exercises twice daily on the first 10 non-treatment days, to mirror the intensity and type of home practice that is routinely prescribed in standard clinical practice. The duration of home practice for the Traditional group also matched the time that the gaming groups spent on behavioral home practice.

Visual aids (e.g., booklet of printed exercises) and typical therapy supplies (e.g., Theraband) were provided to participants to assist them in carrying out their home programs.

1.1.27.3. Characteristics

1.1.27.3.1. Study-level characteristics

Characteristic	Study (N = 83)
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Severity Nominal	NR
Focus of care required Nominal	NR

1.1.27.3.2. Arm-level characteristics

Characteristic	Tele-Gaming (N = 45)	Traditional motor-focused rehabilitation (N = 38)
% Female Sample size	n = 19 ; % = 42	n = 8 ; % = 21
Mean age (SD)	56 (17)	63 (14)

Characteristic	Tele-Gaming (N = 45)	Traditional motor-focused rehabilitation (N = 38)
Mean (SD)		
Time period after stroke (years) Mean (SD)	3.4 (5.1)	5.8 (8.1)

1.1.27.4. Outcomes

1.1.27.4.1. Study timepoints

- Baseline
- 3 week
- 6 month

1.1.27.4.2. Continuous outcomes

Outcome	Tele-Gaming, Baseline, N = 45	Tele-Gaming, 3 week, N = 45	Tele-Gaming, 6 month, N = 45	Traditional motor-focused rehabilitation, Baseline, N = 38	Traditional motor-focused rehabilitation, 3 week, N = 38	Traditional motor-focused rehabilitation, 6 month, N = 38
Physical function - upper limb (Wolf Motor Function Test) (seconds) Scale range: 0-120. Change scores. Mean (SD)	1.6 (0.91)	1.31 (0.75)	1.35 (0.78)	1.81 (0.92)	1.6 (0.95)	1.54 (0.91)

Physical function - upper limb (Wolf Motor Function Test) - Polarity - Lower values are better

1.1.27.4.3. Continuous outcome (mean difference)

Outcome	Tele-Gaming vs Traditional motor-focused rehabilitation, Baseline, N2 = 45, N1 = 38	Tele-Gaming vs Traditional motor-focused rehabilitation, 3 week, N2 = 45, N1 = 38	Tele-Gaming vs Traditional motor-focused rehabilitation, 6 month, N2 = 45, N1 = 38
Physical function - upper limb (Wolf Motor Function Test) (seconds) Scale range: 0-120. Mean difference derived from change scores. Mean (95% CI)	NA (NA to NA)	-0.04 (-0.22 to 0.15)	0.14 (-0.23 to 0.5)

Physical function - upper limb (Wolf Motor Function Test) - Polarity - Lower values are better

1.1.27.4.4. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.27.4.5. Continuousoutcome(meandifference)-Physicalfunction-upperlimb(WolfMotorFunctionTest)-MeanNineFivePercentCI-Tele-Gaming-Traditional motor-focused rehabilitation-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(due to missing data)*
Overall bias and Directness	Overall Directness	Directly applicable

1.1.27.4.6. Continuousoutcome(meandifference)-Physicalfunction-upperlimb(WolfMotorFunctionTest)-MeanNineFivePercentCI-Tele-Gaming-Traditional motor-focused rehabilitation-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(due to missing data)*
Overall bias and Directness	Overall Directness	Directly applicable

1.1.28. Grau-Pellicer, 2020

Bibliographic Reference	Grau-Pellicer, Montserrat; Lalanza, J F; Jovell-Fernandez, E; Capdevila, L; Impact of mHealth technology on adherence to healthy PA after stroke: a randomized study.; Topics in stroke rehabilitation; 2020; vol. 27 (no. 5); 354-368

1.1.28.1. Study details

Secondary publication of another included study- see primary study for details	No additional information.
Other publications associated with this study included in review	No additional information.
Trial name / registration number	No additional information.
Study type	Randomised controlled trial (RCT)

Study location	Spain.
Study setting	Community.
Study dates	March to September 2018.
Sources of funding	This study was funded by the 2018 PERIS grant (Strategic Plan of health research and innovation) by the Departament de Salut of the Catalan Government-Generalitat de Catalunya (SLT006/17/334). It was supported, in part, by DEP2015- 68538 grant from Spain Government. MGP has received Fellowships from the Catalan Department of Health.
Inclusion criteria	Age at least 18 years; diagnosis of ischaemic or haemorrhagic stroke; functional ambulation classification at least 3; Barthel index at least 45.
Exclusion criteria	Diagnosis of cognitive impairment (MMSE no more than 24); unstable cardiovascular disease (acute heart failure, recent myocardial infarction, unstable angina and uncontrolled arrhythmias); alcohol or other toxic substances abuse and decompensated psychiatric disorders that prevented from following a group session.
Recruitment / selection of participants	Recruited from Hospital-Consorci Sanitari de Terrassa (Barcelona, Spain).
Intervention(s)	Combined telerehabilitation and usual care (Multimodal Rehabilitation Program) N=24 App-delivered 8 week intervention of two alternate days a week in sessions of 1 hour (16 sessions in total) in groups of 4-6 participants with a physical therapist who guided the session and consisted of: the implementation of a digital platform based on two mHealth apps, Fitlab Training and Fitlab Test: 1) to supervise adherence to physical activity using the GPS and accelerometer to monitor walking distance and walking speed, 2) to assess mood, effort, recovery, wellness and fatigue questionnaires, 3) to have bidirectional feedback: people could visualise results and exchange messages with the researchers; a pedometer; a WhatsApp group to give motivation for active lifestyle, feedback to participants and create a collective identity in the rehabilitation group; participation in an exercise program for that time that consisted of: aerobic task, oriented training, balance, and stretching exercises; a progressive daily ambulation program at home with the aim to reach physical activity levels recommended by WHO of 150m/week of moderate physical activity, which was monitored by the app and pedometer. At the end of the intervention participants were administered an ad hoc self-reported satisfaction questionnaire. Concomitant therapy: No additional information.

Population subgroups	No additional information.
Subgroup 1 - time after stroke	Chronic (>6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	>45 minutes to 1 hour
Subgroup 4 - Number of days of treatment per week	<5 days a week
Subgroup 5 - Focus of care	Mixed (including multidisciplinary packages of care)
Subgroup 6 - Mode of delivery	Telephone
Subgroup 7 - Mode of feedback	Real time communication Store and forward
Comparator	Conventional rehabilitation N=17 Daily conventional rehabilitation program for 3 months that included: trunk exercises, muscle strengthening, occupational therapy and gait training. Concomitant therapy: No additional information.
Number of participants	41

Duration of follow-up	3 months
Indirectness	No additional information
Additional comments	No additional information about method of analysis. Appears to be completers only.

1.1.28.2. Study arms

1.1.28.2.1. Combined telerehabilitation and usual care (Multimodal Rehabilitation Program) (N = 24)

App-delivered 8 week intervention of two alternate days a week in sessions of 1 hour (16 sessions in total) in groups of 4-6 participants with a physical therapist who guided the session and consisted of: the implementation of a digital platform based on two mHealth apps, Fitlab Training and Fitlab Test: 1) to supervise adherence to physical activity using the GPS and accelerometer to monitor walking distance and walking speed, 2) to assess mood, effort, recovery, wellness and fatigue questionnaires, 3) to have bidirectional feedback: people could visualise results and exchange messages with the researchers; a pedometer; a WhatsApp group to give motivation for active lifestyle, feedback to participants and create a collective identity in the rehabilitation group; participation in an exercise program for that time that consisted of: aerobic task, oriented training, balance, and stretching exercises; a progressive daily ambulation program at home with the aim to reach physical activity levels recommended by WHO of 150m/week of moderate physical activity, which was monitored by the app and pedometer. At the end of the intervention participants were administered an ad hoc self-reported satisfaction questionnaire. Concomitant therapy: No additional information.

1.1.28.2.2. Conventional rehabilitation (N = 17)

Daily conventional rehabilitation program for 3 months that included: trunk exercises, muscle strengthening, occupational therapy and gait training. Concomitant therapy: No additional information.

1.1.28.3. Characteristics

1.1.28.3.1. Arm-level characteristics

Characteristic	Combined telerehabilitation and usual care (Multimodal Rehabilitation Program) (N = 24)	Conventional rehabilitation (N = 17)
% Female Sample size	n = 11 ; % = 45.8	n = 9 ; % = 52.9
Mean age (SD) (years) Mean (SD)	62.96 (11.87)	68.53 (11.53)
Ethnicity Sample size	n = NR ; % = NR	n = NR ; % = NR
Comorbidities Sample size	n = NA ; % = NA	n = NA ; % = NA
Hypertension Sample size	n = 19 ; % = 79.2	n = 13 ; % = 76.5
Diabetes Sample size	n = 11 ; % = 45.8	n = 7 ; % = 41.2
Time period after stroke (Months) Mean (SD)	18.92 (27.6)	20.85 (59.74)
Severity Mean (SD)	NR (NR)	NR (NR)

Characteristic	Combined telerehabilitation and usual care (Multimodal Rehabilitation Program) (N = 24)	Conventional rehabilitation (N = 17)
Focus of care required Sample size	n = NR ; % = NR	n = NR ; % = NR

1.1.28.4. Outcomes

1.1.28.4.1. Study timepoints

- Baseline
- 3 month (<6 months)

1.1.28.4.2. Continuous outcomes

Outcome	Combined telerehabilitation and usual care (Multimodal Rehabilitation Program), Baseline, N = 21	Combined telerehabilitation and usual care (Multimodal Rehabilitation Program), 3 month, N = 21	Conventional rehabilitation, Baseline, N = 13	Conventional rehabilitation, 3 month, N = 13
Person/participant generic health-related quality of life (EQ-5D-5L) Scale range: unclear (does not appear to be -0.11-1 or 0-100). Change scores. Mean (SD)	12.62 (3.78)	-4.19 (0.95)	13.85 (3.1)	-1.31 (0.61)
Activities of daily living (barthel index)	89.05 (13.93)	6.66 (4.41)	75.69 (23.84)	8.93 (9.64)

Outcome	Combined telerehabilitation and usual care (Multimodal Rehabilitation Program), Baseline, N = 21	Combined telerehabilitation and usual care (Multimodal Rehabilitation Program), 3 month, N = 21	Conventional rehabilitation, Baseline, N = 13	Conventional rehabilitation, 3 month, N = 13
Scale range: 0-100. Change scores. Mean (SD)				
Mobility (Timed Up and Go test) (seconds) Change scores Mean (SD)	15.39 (6.37)	-3.46 (0.72)	19.75 (9.17)	4.67 (13.8)

Person/participant generic health-related quality of life (EQ-5D-5L) - Polarity - Lower values are better
Activities of daily living (barthel index) - Polarity - Higher values are better
Mobility (Timed Up and Go test) - Polarity - Lower values are better

1.1.28.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.28.4.4. Continuousoutcomes-Person/participantgenerichealth-relatedqualityoflife(EQ-5D-5L)-MeanSD-Combined telerehabilitation and usual care (Multimodal Rehabilitation Program)-Conventional rehabilitation-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.28.4.5. Continuousoutcomes-Activitiesofdailyliving(barthelindex)-MeanSD-Combined telerehabilitation and usual care (Multimodal Rehabilitation Program)-Conventional rehabilitation-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.28.4.6. Continuousoutcomes-Mobility(TimedUpandGotest)-MeanSD-Combined telerehabilitation and usual care (Multimodal Rehabilitation Program)-Conventional rehabilitation-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.29. Huijgen, 2008

Bibliographic Reference	Huijgen, Barbara C H; Vollenbroek-Hutten, Miriam M R; Zampolini, Mauro; Opisso, Eloy; Bernabeu, Montse; Van Nieuwenhoven, Johan; Ilsbroukx, Stephan; Magni, Riccardo; Giacomozzi, Claudia; Marcellari, Velio; Marchese, Sandro Scattareggia; Hermens, Hermie J; Feasibility of a home-based telerehabilitation system compared to usual care: arm/hand function in patients with stroke, traumatic brain injury and multiple sclerosis.; Journal of telemedicine and telecare; 2008; vol. 14 (no. 5); 249-56

1.1.29.1. Study details

Secondary publication of	NR

another included study- see primary study for details	
Other publications associated with this study included in review	This paper was included in the Cochrane review that this review was based on: Laver KE, Adey-Wakeling Z, Crotty M, Lannin NA, George S, Sherrington C. Telerehabilitation services for stroke. Cochrane Database of Systematic Reviews 2020, Issue 1. Art. No.: CD010255. For further information about the data extraction please see the Cochrane review.
Trial name / registration number	HELLODOC
Study type	Randomised controlled trial (RCT)
Study location	Netherlands
Study setting	Rehabilitation hospital and home based
Study dates	NR
Sources of funding	NR
Inclusion criteria	Inclusion criteria: age > 18 years; established diagnosis of multiple sclerosis, stroke or traumatic brain injury; taking more than 25 seconds to perform the Nine-Hole Peg Test, ability to move at least 1 peg in 180 seconds during the Nine-Hole Peg Test, sufficient autonomous functioning, Internet connection or telephone line and reachable Internet provider, stable clinical status, living at home
Exclusion criteria	Exclusion criteria: disturbed upper limb function not related to multiple sclerosis, traumatic brain injury or stroke; serious cognitive and/or behavioural problems, major visual problems, communication problems, medical complications; other problems, possibly contraindicating autonomous exercise at home
Recruitment / selection of participants	Patients were recruited between October 2005 and January 2007 from recruited from a rehabilitation service in the Netherlands
Intervention(s)	The month of usual care was followed by approximately four training sessions with the HCAD system in the hospital. The actual intervention with the HCAD system at home consisted of one month, whereby the patients had to perform at least one training session a day for five days a week with an average duration of 30 minutes. The HCAD system comprised a hospital-based server and the portable unit which was installed at the patient’s home. The portable unit consisted of seven

	sensorized tools: a key, light bulb, book, jar, writing, checkers and keyboard. With this portable unit a set of exercises could be performed that summarized the movements for correct functional activity of the upper limb such as reaching, grasping, lateral pinch, pinch grip, holding, manipulation and finger dexterity. The portable unit was also equipped with two webcams, which allowed videoconferencing and recording. The videos and the results of the exercises were uploaded to the hospital server where all the data and videos were collected. The therapist used this information for the weekly videoconference with the patient.
Population subgroups	NR
Subgroup 1 - time after stroke	Chronic (>6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 4 - Number of days of treatment per week	5 days per week
Subgroup 5 - Focus of care	Upper limb
Subgroup 6 - Mode of delivery	Videoconferencing
Subgroup 7 - Mode of feedback	Real time communication
Comparator	Subjects in the control group received usual care and generic exercises prescribed by their physicians. The therapists completed a diary which contained the exercises performed by the patients and the treatment received
Number of participants	16
Duration of follow-up	2 months
Indirectness	NR

Additional comments	Study reported a mixed population with other neurological conditions. Data from the stroke only population extracted and included in this review.

1.1.29.2. Study arms

1.1.29.2.1. Telerehabilitation intervention (N = 11)

The month of usual care was followed by approximately four training sessions with the HCAD system in the hospital. The actual intervention with the HCAD system at home consisted of one month, whereby the patients had to perform at least one training session a day for five days a week with an average duration of 30 minutes. The HCAD system comprised a hospital-based server and the portable unit which was installed at the patient's home. The portable unit consisted of seven sensorized tools: a key, light bulb, book, jar, writing, checkers and keyboard. With this portable unit a set of exercises could be performed that summarized the movements for correct functional activity of the upper limb such as reaching, grasping, lateral pinch, pinch grip, holding, manipulation and finger dexterity. The portable unit was also equipped with two webcams, which allowed videoconferencing and recording. The videos and the results of the exercises were uploaded to the hospital server where all the data and videos were collected. The therapist used this information for the weekly videoconference with the patient.

1.1.29.2.2. Usual care (N = 5)

Subjects in the control group received usual care and generic exercises prescribed by their physicians. The therapists completed a diary which contained the exercises performed by the patients and the treatment received.

1.1.29.3. Characteristics

1.1.29.3.1. Study-level characteristics

Characteristic	**Study (N = 16)**
Ethnicity Nominal	NR

Characteristic	Study (N = 16)
Comorbidities Nominal	NR
Severity Nominal	NR
Focus of care required Range	NR to NR

1.1.29.3.2. Arm-level characteristics

Characteristic	Telerehabilitation intervention (N = 11)	Usual care (N = 5)
% Female Sample size	n = 9 ; % = 81	n = 5 ; % = 55.5
Mean age (SD) Mean (SD)	69 (8)	71 (7)
Time period after stroke (years) Mean (SD)	3 (2)	1.8 (0.8)

1.1.29.4. Outcomes

1.1.29.4.1. Study timepoints

- Baseline

- 2 month

1.1.29.4.2. Continuous outcomes

Outcome	Telerehabilitation intervention, Baseline, N = 3	Telerehabilitation intervention, 2 month, N = 3	Usual care, Baseline, N = 9	Usual care, 2 month, N = 9
Physical function upper limb - ARAT 0-57 Mean (SD)	46.7 (11.2)	47.3 (40.9)	40.7 (12.6)	40.9 (13.4)

Physical function upper limb - ARAT - Polarity - Higher values are better

1.1.29.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.29.4.4. Continuousoutcomes-Physicalfunctionupperlimb-ARAT-MeanSD-Telerehabilitation intervention-Usual care-t2

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.30. Jonsdottir, 2021

Bibliographic Reference	Jonsdottir, J.; Baglio, F.; Gindri, P.; Isernia, S.; Castiglioni, C.; Gramigna, C.; Palumbo, G.; Pagliari, C.; Di Tella, S.; Perini, G.; Bowman, T.; Salza, M.; Molteni, F.; Virtual Reality for Motor and Cognitive Rehabilitation From Clinic to Home: A Pilot Feasibility and Efficacy Study for Persons With Chronic Stroke; Frontiers in Neurology; 2021; vol. 12; 601131

1.1.30.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	NR
Trial name / registration number	NR
Study type	Randomised controlled trial (RCT)
Study location	Italy
Study setting	Outpatients from 3 Italian clinical Centers: the Rehabilitation Center Villa Beretta of Lecco, the IRCCS Don Carlo Gnocchi Foundation of Milan, and District Clinic San Camillo of Turin.
Study dates	March 2016 to December 2017
Sources of funding	This research was supported by Fondazione Cariplo.
Inclusion criteria	Inclusion criteria for the persons post-stroke was the following: age range of 18–80 and stroke in the chronic phase, at least 6 months after the acute event.

Exclusion criteria	Exclusion criteria included: (a) Mini Mental State Examination (MMSE) score < 20; (b) the presence of disabling pain; (c) upper limb limited passive range of motion; (d) epilepsy; (e) severe deficit of visual acuity and auditory perception; (f) presence of severe deficit in communication and severe dysmetry.
Recruitment / selection of participants	Forty five persons, outpatients post-stroke, were consecutively recruited from 3 Italian clinical Centers: the Rehabilitation Center Villa Beretta of Lecco, the IRCCS Don Carlo Gnocchi Foundation of Milan, and District Clinic San Camillo of Turin.
Intervention(s)	Concomitant therapy: provided to both groups initially. The ClinicHEAD training was supervised by physical therapists and psychologists. The training was carried out with Kinect (Microsoft, WA, USA) and Leap Motion (Leap Motion Inc., CA, USA) in a room with an area of 20 m2, three times a week for 4 weeks. The image was projected on a television screen with the participants placed in front with ample space to carry out the exercises. Motor, cognitive and occupational exercises were integrated in a paradigm of VR activities. Activities were coarsely divided into those that were more of type motor activities, cognitive activities or occupational activities. Cognitive activities requiring attention, memory, executive function and so on required hand movements for responses and also occupational activities, such as shaving, putting on make-up, doing a puzzle etc. Each activity started with a short movie that was then interrupted periodically with motivating breaks that called for rehabilitative activities. At each movie break a serious game, implying a rehabilitation activity, took place. Moreover, within the single movie break, the virtual activity requested a variable number of repetitions for the specific neuromotor exercise set according to the intensity level of the rehabilitative activities programmed. Both the active group participants and the usual care participants were invited to follow health recommendations of their physician or neurologist for their clinical conditions. Training carried out in the home of the participant without supervision. Training was programmed to be carried out five times per week for ~45 min, and once per week the trained physical therapists and psychologists modified the program for the following week according to participants abilities. The HomeHEAD differed from the ClinicHEAD in that all motor and cognitive activities were carried out in a sitting position. The participants were invited to call the health personnel in case of difficulties with the setup or questions regarding the carrying out of exercises.
Population subgroups	NR

Subgroup 1 - time after stroke	Chronic (>6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	>45 minutes to 1 hour
Subgroup 4 - Number of days of treatment per week	5 days per week
Subgroup 5 - Focus of care	Mixed (including multidisciplinary packages of care)
Subgroup 6 - Mode of delivery	Virtual reality
Subgroup 7 - Mode of feedback	Store and forward
Comparator	The UC participants were asked to not participate in physical activities different from those that they would usually do during the protocol duration. Concomitant therapy: provided to both groups initially. The ClinicHEAD training was supervised by physical therapists and psychologists. The training was carried out with Kinect (Microsoft, WA, USA) and Leap Motion (Leap Motion Inc., CA, USA) in a room with an area of 20 m2, three times a week for 4 weeks. The image was projected on a television screen with the participants placed in front with ample space to carry out the exercises. Motor, cognitive and occupational exercises were integrated in a paradigm of VR activities. Activities were coarsely divided into those that were more of type motor activities, cognitive activities or occupational activities. Cognitive activities requiring attention, memory, executive function and so on required hand movements for responses and also occupational activities, such as shaving, putting on make-up, doing a puzzle etc. Each activity started with a short movie that was then interrupted periodically with motivating breaks that called for rehabilitative activities. At each movie break a serious game, implying a rehabilitation activity, took place. Moreover,

	within the single movie break, the virtual activity requested a variable number of repetitions for the specific neuromotor exercise set according to the intensity level of the rehabilitative activities programmed. Both the active group participants and the usual care participants were invited to follow health recommendations of their physician or neurologist for their clinical conditions.
Number of participants	34
Duration of follow-up	4 months and 7 months
Indirectness	Nr
Additional comments	NR

1.1.30.2. Study arms

1.1.30.2.1. Home VR telerehabilitation (N = 11)

Training carried out in the home of the participant without supervision. Training was programmed to be carried out five times per week for ~45 min, and once per week the trained physical therapists and psychologists modified the program for the following week according to participants abilities. The HomeHEAD differed from the ClinicHEAD in that all motor and cognitive activities were carried out in a sitting position. The participants were invited to call the health personnel in case of difficulties with the setup or questions regarding the carrying out of exercises.

1.1.30.2.2. Usual care (N = 23)

The UC participants were asked to not participate in physical activities different from those that they would usually do during the protocol duration.

1.1.30.3. Characteristics

1.1.30.3.1. Study-level characteristics

Characteristic	Study (N =)
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Severity Nominal	NR
Focus of care required Nominal	NR

1.1.30.3.2. Arm-level characteristics

Characteristic	Home VR telerehabilitation (N = 11)	Usual care (N = 23)
% Female Sample size	n = 6 ; % = 54	n = 8 ; % = 35
Mean age (SD) Mean (SD)	56.72 (17.4)	60.19 (9.63)
Time period after stroke Nominal	NR	NR

1.1.30.4. Outcomes

1.1.30.4.1. Study timepoints

- Baseline
- 4 month
- 7 month

1.1.30.4.2. Continuous outcomes

Outcome	Home VR telerehabilitation, Baseline, N = 11	Home VR telerehabilitation, 4 month, N = 11	Home VR telerehabilitation, 7 month, N = 11	Usual care, Baseline, N = 23	Usual care, 4 month, N = 23	Usual care, 7 month, N = 23
Mobility - 2 minute walk test (meters) final value Mean (SD)	74.27 (35.26)	92.45 (40.4)	90.64 (44.1)	76.06 (52.8)	80.69 (53.19)	76.35 (47.85)
Balance - BBS final value 0-56 Mean (SD)	41.73 (14.95)	42.27 (15.84)	43.45 (14.55)	39.39 (16.14)	40.43 (15.87)	39.26 (16.78)
physical function - upper limb - motricity index (affected side) 0-100 final value Mean (SD)	69 (25.34)	70.63 (22.45)	76.27 (23.52)	58.06 (26.35)	63.12 (27.57)	61.74 (27.41)

Outcome	Home VR telerehabilitation, Baseline, N = 11	Home VR telerehabilitation, 4 month, N = 11	Home VR telerehabilitation, 7 month, N = 11	Usual care, Baseline, N = 23	Usual care, 4 month, N = 23	Usual care, 7 month, N = 23
Stroke-specific measures of cognition - memory (Rivermead behavioural memory test, global memory index) Scale range: 0-100. Final values. Mean (SD)	80.64 (17.7)	91.64 (18.62)	93.27 (19.17)	79.91 (17.46)	86.13 (20.73)	88.6 (20.18)

Mobility - 2 minute walk test - Polarity - Higher values are better
Balance - BBS - Polarity - Higher values are better
physical function - upper limb - motricity index (affected side) - Polarity - Higher values are better
Stroke-specific measures of cognition - memory (Rivermead behavioural memory test, global memory index) - Polarity - Higher values are better

1.1.30.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.30.4.4. Continuousoutcomes-Mobility-2minutewalktest-MeanSD-Home VR telerehabilitation-Usual care-t4

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns
Overall bias and Directness	Overall Directness	Directly applicable

1.1.30.4.5. Continuousoutcomes-Mobility-2minutewalktest-MeanSD-Home VR telerehabilitation-Usual care-t7

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.30.4.6. Continuousoutcomes-Balance-BBS-MeanSD-Home VR telerehabilitation-Usual care-t4

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns
Overall bias and Directness	Overall Directness	Directly applicable

1.1.30.4.7. Continuousoutcomes-Balance-BBS-MeanSD-Home VR telerehabilitation-Usual care-t7

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.30.4.8. Continuousoutcomes-physicalfunction-upperlimb-motricityindex(affectedside)-MeanSD-Home VR telerehabilitation-Usual care-t4

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable

1.1.30.4.9. Continuousoutcomes-physicalfunction-upperlimb-motricityindex(affectedside)-MeanSD-Home VR telerehabilitation-Usual care-t7

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.30.4.10. Continuousoutcomes-Stroke-specificmeasuresofcognition-memory(Rivermeadbehaviouralmemorytest,globalmemoryindex)-MeanSD-Home VR telerehabilitation-Usual care-t4

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns
Overall bias and Directness	Overall Directness	Directly applicable

1.1.30.4.11. Continuousoutcomes-Stroke-specificmeasuresofcognition-memory(Rivermeadbehaviouralmemorytest,globalmemoryindex)-MeanSD-Home VR telerehabilitation-Usual care-t7

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.31. Kirkness, 2017

Bibliographic Reference	Kirkness, Catherine J; Cain, Kevin C; Becker, Kyra J; Tirschwell, David L; Buzaitis, Ann M; Weisman, Pamela L; McKenzie, Sylvia; Teri, Linda; Kohen, Ruth; Veith, Richard C; Mitchell, Pamela H; Randomized trial of telephone versus in-person delivery of a brief psychosocial intervention in post-stroke depression.; BMC research notes; 2017; vol. 10 (no. 1); 500

1.1.31.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	This paper was included in the Cochrane review that this review was based on: Laver KE, Adey-Wakeling Z, Crotty M, Lannin NA, George S, Sherrington C. Telerehabilitation services for stroke. Cochrane Database of Systematic Reviews 2020, Issue 1. Art. No.: CD010255. For further information about the data extraction please see the Cochrane review.
Trial name / registration number	NCT01133106
Study type	Randomised controlled trial (RCT)
Study location	USA
Study setting	Six university and community hospitals in the Seattle, WA area and home based
Study dates	NR
Sources of funding	This work was funded by a Grant from the National Institute of Nursing Research, National Institutes of Health to Catherine J. Kirkness and Pamela H. Mitchell (multiple principal investigators), R01NR007755

Inclusion criteria	Inclusion criteria: within 4 months of an ischaemic or haemorrhagic stroke (verified by CT or MRI) with clinical depression (≥ 11 on the Geriatric Depression Scale)
Exclusion criteria	NR
Recruitment / selection of participants	Patients were recruited from six university and community hospitals in the Seattle, WA area.
Intervention(s)	'Living Well With Stroke 2 intervention': 1 in-person orientation session with the psychosocial nurse practitioner therapist, either in their home or at the study offices. They received the participant manuals and discussed goals and expectations. Following the in-person orientation session, each of the subsequent 6 sessions occurred by telephone. Topics were as follows: (1) introduction to behavioural therapy for depression after stroke, pleasant events; (2) scheduling pleasant events: problems and planning; (3) managing depression behaviours: problem-solving techniques; (4) changing negative thoughts and behaviours; (5) problem-solving in depth; (6) review of skills, generalsation and strategies for maintenance of skills. Session length ranged from 10 to 80 minutes, with the telephone sessions somewhat shorter than the in-person ones (average 26 minutes versus 38 minutes). Participants in the intervention arms saw their primary care or stroke provider for stroke follow-up care and were provided antidepressants as prescribed by their providers.
Population subgroups	NR
Subgroup 1 - time after stroke	Subacute (7 days - 6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	≤45 minutes
Subgroup 4 - Number of days of treatment per week	<5 days a week
Subgroup 5 - Focus of care	Mood

Subgroup 6 - Mode of delivery	Telephone
Subgroup 7 - Mode of feedback	Real time communication
Comparator	In person: The same 'Living Well With Stroke 2' intervention but provided in-person (usually in the participant's home). Control intervention: usual care
Number of participants	100
Duration of follow-up	8 weeks
Indirectness	NR
Additional comments	NR

1.1.31.2. Study arms

1.1.31.2.1. Telerehabilitation intervention (N = 37)

'Living Well With Stroke 2 intervention': 1 in-person orientation session with the psychosocial nurse practitioner therapist, either in their home or at the study offices. They received the participant manuals and discussed goals and expectations. Following the in-person orientation session, each of the subsequent 6 sessions occurred by telephone. Topics were as follows: (1) introduction to behavioural therapy for depression after stroke, pleasant events; (2) scheduling pleasant events: problems and planning; (3) managing depression behaviours: problem-solving techniques; (4) changing negative thoughts and behaviours; (5) problem-solving in depth; (6) review of skills, generalsation and strategies for maintenance of skills. Session length ranged from 10 to 80 minutes, with the telephone sessions somewhat shorter than the in-person ones (average 26 minutes versus 38 minutes). Participants in the intervention arms saw their primary care or stroke provider for stroke follow-up care and were provided antidepressants as prescribed by their providers.

1.1.31.2.2. In person therapy and usual care (N = 63)

In person: The same 'Living Well With Stroke 2' intervention but provided in-person (usually in the participant's home). Control intervention: usual care

1.1.31.3. Characteristics

1.1.31.3.1. Study-level characteristics

Characteristic	Study (N = 100)
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Time period after stroke Nominal	NR
Focus of care required Nominal	NR

1.1.31.3.2. Arm-level characteristics

Characteristic	Telerehabilitation intervention (N = 37)	In person therapy and usual care (N = 63)
% Female Sample size	n = 18 ; % = 48.6	n = 32 ; % = 50.7

Characteristic	Telerehabilitation intervention (N = 37)	In person therapy and usual care (N = 63)
Mean age (SD) Mean (SD)	61.7 (NR)	54.4 (NR)
Severity Mean (SD)	3.4 (3.4)	3.3 (3.2)

1.1.31.4. Outcomes

1.1.31.4.1. Study timepoints

- Baseline
- 8 week

1.1.31.4.2. Continuous outcomes

Outcome	Telerehabilitation intervention, Baseline, N = 37	Telerehabilitation intervention, 8 week, N = 34	In person therapy and usual care, Baseline, N = 63	In person therapy and usual care, 8 week, N = 31
Psychological distress - depression (Hamilton Rating Scale for Depression) data taken from the Cochrane review as unavailable in study. Scale range: 0-56. Final values. Mean (SD)	NR (NR)	11.1 (5.3)	NR (NR)	11.1 (4.7)

Psychological distress - depression (Hamilton Rating Scale for Depression) - Polarity - Lower values are better

1.1.31.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.31.4.4. Continuousoutcomes-psychologicaldistress-depression-HamiltonRatingScaleforDepression—HRSD-MeanSD-Telerehabilitation intervention-In person therapy and usual care-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns
Overall bias and Directness	Overall Directness	Directly applicable

1.1.32. Lee, 2022

Bibliographic Reference	Lee, So Jung; Lee, Eun Chae; Kim, Muhyun; Ko, Sung-Hwa; Huh, Sungchul; Choi, Woosik; Shin, Yong-Il; Min, Ji Hong; Feasibility of dance therapy using telerehabilitation on trunk control and balance training in patients with stroke: A pilot study.; Medicine; 2022; vol. 101 (no. 35); e30286

1.1.32.1. Study details

Secondary publication of another included study- see primary study for details	Nr
Other publications associated with	NR

this study included in review	
Trial name / registration number	NR
Study type	Randomised controlled trial (RCT)
Study location	Republic of Korea.
Study setting	Inpatients in the Department of Rehabilitation Medicine of Pusan National University Yangsan Hospital
Study dates	NR
Sources of funding	This study was supported by Research Institute for Convergence of Biomedical Science and Technology Grant (30-2019-012), Pusan National University Yangsan Hospital.
Inclusion criteria	The inclusion criteria were hemiplegia occurring >1 month after the first occurrence of stroke, ability to maintain a sitting posture alone and walk 10 m independently or with the aid of a minimum assistive device, and the ability to tolerate 40 minutes of activity.
Exclusion criteria	The exclusion criteria were severe cognitive, visual, or hearing functional impairments; lower extremity musculoskeletal abnormalities or injuries, neurological diseases other than stroke, and preexisting conditions that affect balance function.
Recruitment / selection of participants	All participants were inpatients recruited from the Department of Rehabilitation Medicine of Pusan National University Yangsan Hospital.
Intervention(s)	In addition to conventional physical therapy, the experimental group (n = 7) participated in 40-minute, non-face-to-face, dance-therapy sessions – twice a week for 3 weeks – with a dance instructor experienced in working with people with physical disabilities. To create an environment that resembled home-based telerehabilitation as closely as possible, the dance program was conducted in an independent space through real-time desktop videoconferencing using Zoom (Zoom Video Communications Inc, San Jose, CA); 2-way audio-visual communication enabled interaction between the parties, allowing the dance instructor to guide the participants. Desktops and TV monitors with video cameras were installed in front of the space; this enabled the dance instructor to observe the participants and provide realtime feedback and modification as required, as well as facilitate peer support from other participants. For safety purposes, any obstacles were removed, and a caregiver participated in the dance program along with the patient; the researcher monitored the occurrence of any safety accidents, such as falls, from outside the classroom. The protocol of this study was based on the Dance for PD[6] has been newly applied to stroke patients. This study was performed by a professional therapist (choreographer) who

	completed Dance for PD reconstructing movements that can help balance or gait function in consideration of the characteristics of hemiplegic patients. Each participant in the experimental group (n = 7) attended a 40-minute virtual dance class bi-weekly for 3 weeks. Generally, classes began with a warm-up while sitting, which transitioned into chair and/or standing choreography; this was followed by dance-skill practice at the center of the room.
Population subgroups	NR
Subgroup 1 - time after stroke	Subacute (7 days - 6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	≤45 minutes
Subgroup 4 - Number of days of treatment per week	<5 days a week
Subgroup 5 - Focus of care	Upper limb Lower limb
Subgroup 6 - Mode of delivery	Videoconferencing
Subgroup 7 - Mode of feedback	Real time communication
Comparator	The control group (n = 7) received conventional physical therapy for the duration the experimental group received therapy (the dance program in addition to existing conventional physical therapy).
Number of participants	14
Duration of follow-up	3 weeks

Indirectness	NR
Additional comments	NR

1.1.32.2. Study arms

1.1.32.2.1. Telerehab dance therapy (N = 7)

In addition to conventional physical therapy, the experimental group (n = 7) participated in 40-minute, non-face-to-face, dance-therapy sessions – twice a week for 3 weeks – with a dance instructor experienced in working with people with physical disabilities. To create an environment that resembled home-based telerehabilitation as closely as possible, the dance program was conducted in an independent space through real-time desktop videoconferencing using Zoom (Zoom Video Communications Inc, San Jose, CA); 2-way audio-visual communication enabled interaction between the parties, allowing the dance instructor to guide the participants. Desktops and TV monitors with video cameras were installed in front of the space; this enabled the dance instructor to observe the participants and provide realtime feedback and modification as required, as well as facilitate peer support from other participants (Fig. 1). For safety purposes, any obstacles were removed, and a caregiver participated in the dance program along with the patient; the researcher monitored the occurrence of any safety accidents, such as falls, from outside the classroom.

1.1.32.2.2. Conventional therapy (N = 7)

The control group (n = 7) received conventional physical therapy for the duration the experimental group received therapy (the dance program in addition to existing conventional physical therapy).

1.1.32.3. Characteristics

1.1.32.3.1. Study-level characteristics

Characteristic	**Study (N = 14)**
Ethnicity	NR

Characteristic	Study (N = 14)
Nominal	
Comorbidities Nominal	NR

1.1.32.3.2. Arm-level characteristics

Characteristic	Telerehab dance therapy (N = 7)	Conventional therapy (N = 7)
% Female Sample size	n = 2 ; % = 28.6	n = 2 ; % = 28.6
Mean age (SD) Mean (SD)	54.71 (17.08)	61.14 (14.45)
Time period after stroke Mean (SD)	159 (113.02)	113 (267)

1.1.32.4. Outcomes

1.1.32.4.1. Study timepoints

- Baseline
- 3 week

1.1.32.4.2. Continuous outcomes

Outcome	Telerehab dance therapy , Baseline, N = 9	Telerehab dance therapy , 3 week, N = 7	Conventional therapy, Baseline, N = 8	Conventional therapy, 3 week, N = 7
Person/participant generic health-related quality of life (EQ5D index score) Scale range: -0.11-1. Final values. Mean (SD)	0.7 (0.12)	0.77 (0.12)	0.65 (0.12)	0.75 (0.07)
Activities of daily living (Korean modified Barthel Index) Scale range: 0-100. Final values. Mean (SD)	68.29 (18.38)	75.43 (16.22)	61 (16.67)	73.86 (16.59)
Mobilty (timed up and go) (seconds) Final values Mean (SD)	43.14 (31.92)	35.14 (24.73)	30.43 (16.63)	22.86 (10.29)
Balance (Berg Balance Scale) Scale range: 0-56. Final values. Mean (SD)	38.57 (12.91)	41.89 (12.88)	40.29 (8.86)	46.71 (6.32)

Person/participant generic health-related quality of life (EQ5D index score) - Polarity - Higher values are better
Activities of daily living (Korean modified Barthel Index) - Polarity - Higher values are better
Mobilty (timed up and go) - Polarity - Lower values are better
Balance (Berg Balance Scale) - Polarity - Higher values are better

1.1.32.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.32.4.4. Continuousoutcomes-Person/participantgenerichealth-relatedqualityoflife-EQ5Dindexscore-MeanSD-Telerehab dance therapy -Conventional therapy-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns
Overall bias and Directness	Overall Directness	Directly applicable

1.1.32.4.5. Continuousoutcomes-Balance-bergblancescale-MeanSD-Telerehab dance therapy -Conventional therapy-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low
Overall bias and Directness	Overall Directness	Directly applicable

1.1.32.4.6. Continuousoutcomes-Mobilty-timedupandgo-MeanSD-Telerehab dance therapy -Conventional therapy-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low
Overall bias and Directness	Overall Directness	Directly applicable

1.1.32.4.7. Continuousoutcomes-Activitiesofdailyliving-KoreanModifiedBarthelIndex-MeanSD-Telerehab dance therapy - Conventional therapy-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low
Overall bias and Directness	Overall Directness	Directly applicable

1.1.33. Lin, 2014

Bibliographic Reference	Lin, Kwan-Hwa; Chen, Chin-Hsing; Chen, You-Yin; Huang, Wen-Tzeng; Lai, Jin-Shin; Yu, Shang-Ming; Chang, Yuan-Jen; Bidirectional and multi-user telerehabilitation system: clinical effect on balance, functional activity, and satisfaction in patients with chronic stroke living in long-term care facilities.; Sensors (Basel, Switzerland); 2014; vol. 14 (no. 7); 12451-66

1.1.33.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	This paper was included in the Cochrane review that this review was based on: Laver KE, Adey-Wakeling Z, Crotty M, Lannin NA, George S, Sherrington C. Telerehabilitation services for stroke. Cochrane Database of Systematic Reviews 2020, Issue 1. Art. No.: CD010255. For further information about the data extraction please see the Cochrane review.
Trial name / registration number	NR

Study type	Randomised controlled trial (RCT)
Study location	Taiwan
Study setting	Three different long term care facilities (two rural facilities in Taipei, Taiwan and one rural facility in Taichung, Taiwan). Three LTCFs located at different distances allowed us to examine the telerehabiliation availability with Taiwan wired network (TANET) at short (7.4 km), medium (40 km), and long distances (175 km)
Study dates	NR
Sources of funding	This project was reviewed and funded by the Ministry of Science and Technology, Taiwan (Grant No. 99- 2218-E-002-004).
Inclusion criteria	Inclusion criteria: history of cerebral vascular accident (including first and recurrent stroke) for more than 6 months; living in LTCFs for more than 3 months; having active movement of the proximal part of upper extremity in the hemiparetic side (Brunnstrom stage U/E ≥ 3); being able to sit for short periods without hand support for at least 30 seconds; having cognitive status screened using the Mini-Cog test and being able to follow the instruction; and being able to communicate and follow a 3-step command
Exclusion criteria	Exclusion criteria: having other neuromusculoskeletal condition and systemic diseases such as Parkinson's disease and uncontrolled heart disease; blindness and deafness; and having a psychiatric hist
Recruitment / selection of participants	Recruited from 3 long-term care facilities (LTCFs) in Taiwan
Intervention(s)	Tele-balance training focused on 10 minutes of standing exercise according to 3D animation exercise videos and about 10 minutes of 3D interactive games with finger touching the touch screen in standing posture. 1 therapist conducted the telerehabilitation balance training at the therapist end to each facility for 1 month, separately. 1 volunteer or non-medical person was assigned at the patient end for safety and assistance in telerehabilitation and conventional training.
Population subgroups	NR
Subgroup 1 - time after stroke	Chronic (>6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of	>45 minutes to 1 hour

intervention per day	
Subgroup 4 - Number of days of treatment per week	<5 days a week
Subgroup 5 - Focus of care	Lower limb Functional independency
Subgroup 6 - Mode of delivery	Videoconferencing
Comparator	Two post-stroke participants attended the same session as the small therapy group. The therapist onducted conventional balance training programs following simple to complex principle. However, the small ball and peg bars are used for hand manipulation during sitting and standing balance training.
Number of participants	24
Duration of follow-up	4 weeks
Indirectness	NR
Additional comments	NR

1.1.33.2. Study arms

1.1.33.2.1. Telerehabilitation balance intervention (N = 12)

Tele-balance training focused on 10 minutes of standing exercise according to 3D animation exercise videos and about 10 minutes of 3D interactive games with finger touching the touch screen in standing posture. 1 therapist conducted the telerehabilitation balance training at the therapist end to each facility for 1 month, separately. 1 volunteer or non-medical person was assigned at the patient end for safety and assistance in telerehabilitation and conventional training.

1.1.33.2.2. Control balance training (N = 12)

Two post-stroke participants attended the same session as the small therapy group. The therapist onducted conventional balance training programs following simple to complex principle. However, the small ball and peg bars are used for hand manipulation during sitting and standing balance training.

1.1.33.3. Characteristics

1.1.33.3.1. Study-level characteristics

Characteristic	Study (N = 24)
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Severity Nominal	NR
Focus of care required Nominal	NR

1.1.33.3.2. Arm-level characteristics

Characteristic	Telerehabilitation balance intervention (N = 12)	Control balance training (N = 12)
% Female Sample size	n = 2 ; % = 16.6	n = 5 ; % = 41.6

Characteristic	Telerehabilitation balance intervention (N = 12)	Control balance training (N = 12)
Mean age (SD) Mean (SD)	74.6 (2.3)	75.6 (3.4)
Time period after stroke Mean (SD)	31.8 (11.3)	41.7 (12.4)

1.1.33.4. Outcomes

1.1.33.4.1. Study timepoints

- Baseline
- 4 week

1.1.33.4.2. Continuous outcomes

Outcome	Telerehabilitation balance intervention, Baseline, N = 12	Telerehabilitation balance intervention, 4 week, N = 12	Control balance training, Baseline, N = 12	Control balance training, 4 week, N = 12
Activities of daily living (barthel index) Scale range: 0-100. Final values. Mean (SD)	52.9 (32.9)	57.9 (3.1)	57.9 (26.7)	60.8 (22.5)
Balance (Berg Balance Scale)	20.4 (17)	24.6 (18.4)	22.4 (18.4)	26.9 (18)

Outcome	Telerehabilitation balance intervention, Baseline, N = 12	Telerehabilitation balance intervention, 4 week, N = 12	Control balance training, Baseline, N = 12	Control balance training, 4 week, N = 12
Scale range: 0-56. Final values. Mean (SD)				

Activities of daily living (barthel index) - Polarity - Higher values are better
Balance (Berg Balance Scale) - Polarity - Higher values are better

1.1.33.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.33.4.4. Continuousoutcomes-Activitiesofdailyliving(barthelindex)-MeanSD-Telerehabilitation balance intervention-Control balance training-t4

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(due to bias arising from randomisation process)*
Overall bias and Directness	Overall Directness	Directly applicable

1.1.33.4.5. Continuousoutcomes-Balance(BergBalanceScale)-MeanSD-Telerehabilitation balance intervention-Control balance training-t4

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(due to bias arising from randomisation process)*

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable

1.1.34. Lloréns, 2015

Bibliographic Reference	Lloréns R; Noé E; Colomer C; Alcañiz M; Effectiveness, usability, and cost-benefit of a virtual reality-based telerehabilitation program for balance recovery after stroke: a randomized controlled trial.; Archives of physical medicine and rehabilitation; 2015; vol. 96 (no. 3)

1.1.34.1. Study details

Secondary publication of another included study- see primary study for details	Nr
Other publications associated with this study included in review	NR
Trial name / registration number	NR
Study type	Randomised controlled trial (RCT)
Study location	Spain
Study setting	Outpatients of the neurorehabilitation unit of a large metropolitan hospital in Spain. Hospital and home based
Study dates	NR

Sources of funding	This study was funded in part by Ministerio de Economía y Competitividad, Project TEREHA (IDI-20110844), Ministerio de Educación y Ciencia, Projects Consolider-C (SEJ2006-14301/PSIC), “CIBER of Physiopathology of Obesity and Nutrition, an initiative of ISCIII” and the Excellence Research Program PROMETEO (Generalitat Valenciana. Conselleria de Educación, 2008-157).
Inclusion criteria	Inclusion criteria: age ≥ 40 and ≤ 75 years; chronicity > 6 months; Brunel Balance Assessment (BBA): section 3, levels 7 to 12; Mini Mental State Examination score > 23; and Internet access in their homes
Exclusion criteria	Exclusion criteria: individuals with severe aphasia (Mississippi Aphasia Screening Test cut-oG score < 45); individuals with hemispatial neglect; and individuals with ataxia or any other cerebellar symptom
Recruitment / selection of participants	NR
Intervention(s)	All the participants underwent 20 x 45-minute training sessions with the telerehabilitation system, conducted 3 times a week. The difficulty of the training was initially adjusted by PTA in an exploratory session. During the intervention, the difficulty of the task was adjusted either by the therapist or automatically by the system. The progress of all the participants was checked remotely once a week by PTA to detect possible issues and respond accordingly. In addition, PTB had a brief interview with participants of the experimental group each week to detect possible technical problems and to troubleshoot. The aim of the intervention was to improve balance. Concomitant therapy - On the remaining days (Tuesday and Thursday), both groups received conventional physical therapy in the clinic.
Population subgroups	NR
Subgroup 1 - time after stroke	Chronic (>6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	≤45 minutes
Subgroup 4 - Number of days of treatment per week	5 days per week

Subgroup 5 - Focus of care	Functional independency Balance
Subgroup 6 - Mode of delivery	Virtual reality
Subgroup 7 - Mode of feedback	Real time communication
Comparator	Control intervention: participants belonging to the control group trained with the VR system in the clinic.
Number of participants	31
Duration of follow-up	12 weeks
Indirectness	NR
Additional comments	NR

1.1.34.2. Study arms

1.1.34.2.1. VR balance training via telerehabilitation (N = 15)

All the participants underwent 20 x 45-minute training sessions with the telerehabilitation system, conducted 3 times a week. The difficulty of the training was initially adjusted by PTA in an exploratory session. During the intervention, the difficulty of the task was adjusted either by the therapist or automatically by the system. The progress of all the participants was checked remotely once a week by PTA to detect possible issues and respond accordingly. In addition, PTB had a brief interview with participants of the experimental group each week to detect possible technical problems and to troubleshoot. The aim of the intervention was to improve balance. Concomitant therapy - On the remaining days (Tuesday and Thursday), both groups received conventional physical therapy in the clinic.

1.1.34.2.2. VR balance training hospital based (N = 16)

Control intervention: participants belonging to the control group trained with the VR system in the clinic.

1.1.34.3. Characteristics

1.1.34.3.1. Study-level characteristics

Characteristic	Study (N = 31)
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Severity Mean (SD)	NR (NR)
Focus of care required Nominal	NR

1.1.34.3.2. Arm-level characteristics

Characteristic	VR balance training via telerehabilitation (N = 15)	VR balance training hospital based (N = 16)
% Female Sample size	n = 5 ; % = 33.3	n = 8 ; % = 33.3
Mean age (SD)	55.47 (9.63)	55.6 (7.29)

Characteristic	VR balance training via telerehabilitation (N = 15)	VR balance training hospital based (N = 16)
Mean (SD)		
Time period after stroke Mean (SD)	334.13 (60.79)	316.73 (49.81)

1.1.34.4. Outcomes

1.1.34.4.1. Study timepoints

- Baseline
- 12 week

1.1.34.4.2. Continuous outcomes

Outcome	VR balance training via telerehabilitation, Baseline, N = 15	VR balance training via telerehabilitation, 12 week, N = 15	VR balance training hospital based, Baseline, N = 16	VR balance training hospital based, 12 week, N = 15
Balance (Berg Balance Scale) Scale range: 0-56. Final values. Mean (SD)	47.53 (3.85)	51.53 (2.07)	48.8 (5.01)	51.27 (5.12)

Balance (Berg Balance Scale) - Polarity - Higher values are better

1.1.34.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.34.4.4. Continuousoutcomes-Balance-BBS-finalvalues-MeanSD-VR balance training via telerehabilitation-VR balance training hospital based-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns
Overall bias and Directness	Overall Directness	Directly applicable

1.1.35. Maresca, 2019

Bibliographic Reference Maresca, Giuseppa; Maggio, Maria Grazia; Latella, Desiree; Cannavo, Antonino; De Cola, Maria Cristina; Portaro, Simona; Stagnitti, Maria Chiara; Silvestri, Giuseppe; Torrisi, Michele; Bramanti, Alessia; De Luca, Rosaria; Calabro, Rocco Salvatore; Toward Improving Poststroke Aphasia: A Pilot Study on the Growing Use of Telerehabilitation for the Continuity of Care.; Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association; 2019; vol. 28 (no. 10); 104303

1.1.35.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	NR

Trial name / registration number	NR
Study type	Randomised controlled trial (RCT)
Study location	Italy
Study setting	Inpatient initially moving to outpatient
Study dates	Nr
Sources of funding	NR
Inclusion criteria	Diagnosis of vascular brain injury of either haemorrhagic or ischaemic etiology (the latter involving the middle cerebral artery); absence of severe spasticity with an Ashworth Scale less than 3; absence of disabling sensory alterations (i.e. hearing and visual loss); absence of severe medical and psychiatric illness, according to the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition and International Classification of Diseases-10.
Exclusion criteria	Severe paresis of the upper limb (muscle research council <3); severe cognitive impairment; epileptic seizures nonresponding to treatment.
Recruitment / selection of participants	All people were inpatients admitted to the IRCCS Centro Neurolesi "Bonino-Pulejo" of Messina.
Intervention(s)	Virtual reality rehabilitation system-tablet for speech and language therapy: Two phases. In phase one: experimental linguistic therapy performed using a virtual reality rehabilitation system. Each exercise of the therapy had a self-advancement of difficulty, to guarantee the best-personalised training. In phase 2, they were provided with a touchscreen tablet (virtual reality rehabilitation system-tablet) both the groups were submitted to the same amount of treatment. The tablet contained the previous linguistic exercises modulated on the capability of each patient. Twice a week the neuropsychologist performed a videoconference to monitor the rehabilitation process carried out in their own home and discuss the feasibility and performance of the exercises. The tablet allowed for provision of exercises and monitoring of the person remotely in their home. The tablet contains about 30 different exercises with over 1000 customisable and editable levels, divided into cognitive and linguistic modules, which includes exercises on attention, memory, perception, executive functions and speech/language abilities. The exercises automatically adapt to the person's performance. There were two main categories of exercises, the first being 2D exercises in which the person interacts with objects and scenarios through the touch screen or particular magnetic sensor coupled with a button, which emulates mouse interaction. The second one consists of 3D exercises, in which people interact with 3D virtual scenarios and immersive objects through a magnetic localisation sensor generally positioned on the hand. The study lasted 6 months and included the two phases which lasted

	12 weeks each. Training was completed 5 days a week with each session lasting about 50 minutes. Concomitant therapy: No additional information.
Population subgroups	NR
Subgroup 1 - time after stroke	Unclear/not stated
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	>45 minutes to 1 hour
Subgroup 4 - Number of days of treatment per week	5 days per week
Subgroup 5 - Focus of care	Communication
Subgroup 6 - Mode of delivery	Videoconferencing
Subgroup 7 - Mode of feedback	Real time communication
Comparator	Traditional linguistic treatment with the same exercises as the experimental linguistic therapy. The study lasted 6 months and included the two phases which lasted 12 weeks each. Training was completed 5 days a week with each session lasting about 50 minutes. Concomitant therapy: No additional information.
Number of participants	30
Duration of follow-up	6 months
Indirectness	NR

Additional comments	NR

1.1.35.2. Study arms

1.1.35.2.1. Computer-based tools for speech and language therapy (virtual reality rehabilitation system-tablet) (N = 15)

Two phases. In phase one: experimental linguistic therapy performed using a virtual reality rehabilitation system. Each exercise of the therapy had a self-advancement of difficulty, to guarantee the best-personalised training. In phase 2, they were provided with a touchscreen tablet (virtual reality rehabilitation system-tablet) both the groups were submitted to the same amount of treatment. The tablet contained the previous linguistic exercises modulated on the capability of each patient. Twice a week the neuropsychologist performed a videoconference to monitor the rehabilitation process carried out in their own home and discuss the feasibility and performance of the exercises. The tablet allowed for provision of exercises and monitoring of the person remotely in their home. The tablet contains about 30 different exercises with over 1000 customisable and editable levels, divided into cognitive and linguistic modules, which includes exercises on attention, memory, perception, executive functions and speech/language abilities. The exercises automatically adapt to the person's performance. There were two main categories of exercises, the first being 2D exercises in which the person interacts with objects and scenarios through the touch screen or particular magnetic sensor coupled with a button, which emulates mouse interaction. The second one consists of 3D exercises, in which people interact with 3D virtual scenarios and immersive objects through a magnetic localisation sensor generally positioned on the hand. The study lasted 6 months and included the two phases which lasted 12 weeks each. Training was completed 5 days a week with each session lasting about 50 minutes. Concomitant therapy: No additional information.

1.1.35.2.2. Speech and language therapy without computer-based tools (usual care) (N = 15)

Traditional linguistic treatment with the same exercises as the experimental linguistic therapy. The study lasted 6 months and included the two phases which lasted 12 weeks each. Training was completed 5 days a week with each session lasting about 50 minutes. Concomitant therapy: No additional information.

1.1.35.3. Characteristics

1.1.35.3.1. Study-level characteristics

Characteristic	Study (N = 30)
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Time period after stroke Nominal	NR
Severity Nominal	NR
Focus of care required Nominal	NR

1.1.35.3.2. Arm-level characteristics

Characteristic	Computer-based tools for speech and language therapy (virtual reality rehabilitation system-tablet) (N = 15)	Speech and language therapy without computer-based tools (usual care) (N = 15)
% Female Sample size	n = 8 ; % = 53.3	n = 8 ; % = 53.3

Characteristic	Computer-based tools for speech and language therapy (virtual reality rehabilitation system-tablet) (N = 15)	Speech and language therapy without computer-based tools (usual care) (N = 15)
Mean age (SD) Mean (SD)	51.1 (10.3)	51.4 (12.7)

1.1.35.4. Outcomes

1.1.35.4.1. Study timepoints

- Baseline
- 6 month

1.1.35.4.2. Continuous outcomes

Outcome	Computer-based tools for speech and language therapy (virtual reality rehabilitation system-tablet), Baseline, N = 15	Computer-based tools for speech and language therapy (virtual reality rehabilitation system-tablet), 6 month, N = 15	Speech and language therapy without computer-based tools (usual care), Baseline, N = 15	Speech and language therapy without computer-based tools (usual care), 6 month, N = 15
Person/participant generic health-related quality of life (EuroQol-5D) Scale range: 0-100. Least square mean estimates and standard errors Mean (SE)	NR (NR)	22 (1.95)	NR (NR)	8.7 (1.95)

Outcome	Computer-based tools for speech and language therapy (virtual reality rehabilitation system-tablet), Baseline, N = 15	Computer-based tools for speech and language therapy (virtual reality rehabilitation system-tablet), 6 month, N = 15	Speech and language therapy without computer-based tools (usual care), Baseline, N = 15	Speech and language therapy without computer-based tools (usual care), 6 month, N = 15
Communication - impairment specific measures, auditory comprehension (Token test) Scale range: 0-36. Least square mean estimates and standard errors. Mean (SE)	NR (NR)	-7.3 (0.59)	NR (NR)	-2 (0.59)
Psychological distress - depression (Aphasic Depression Rating Scale) Scale range: Unclear. Least square mean estimates and standard errors Mean (SE)	NR (NR)	6.5 (0.68)	NR (NR)	2.3 (0.68)

Person/participant generic health-related quality of life (EuroQol-5D) - Polarity - Higher values are better
Communication - impairment specific measures, auditory comprehension (Token test) - Polarity - Higher values are better
Psychological distress - depression (Aphasic Depression Rating Scale) - Polarity - Lower values are better

1.1.35.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.35.4.4. Continuousoutcomes-Person/participantgenerichealth-relatedqualityoflife(EuroQol-5D)-MeanSE-Computer-based tools for speech and language therapy (virtual reality rehabilitation system-tablet)-Speech and language therapy without computer-based tools (usual care)-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.35.4.5. Continuousoutcomes-Communication-impairmentspecificmeasures,auditorycomprehension(Tokentest)-MeanSE-Computer-based tools for speech and language therapy (virtual reality rehabilitation system-tablet)-Speech and language therapy without computer-based tools (usual care)-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.35.4.6. Continuousoutcomes-Psychologicaldistress-depression(AphasicDepressionRatingScale)-MeanSE-Computer-based tools for speech and language therapy (virtual reality rehabilitation system-tablet)-Speech and language therapy without computer-based tools (usual care)-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.36. Meltzer, 2018

Bibliographic Reference	Meltzer, J.A.; Baird, A.J.; Steele, R.D.; Harvey, S.J.; Computer-based treatment of poststroke language disorders: a non-inferiority study of telerehabilitation compared to in-person service delivery; Aphasiology; 2018; vol. 32 (no. 3); 290-311

1.1.36.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	This paper was included in the Cochrane review that this review was based on: Laver KE, Adey-Wakeling Z, Crotty M, Lannin NA, George S, Sherrington C. Telerehabilitation services for stroke. Cochrane Database of Systematic Reviews 2020, Issue 1. Art. No.: CD010255. For further information about the data extraction please see the Cochrane review.
Trial name / registration number	NR
Study type	Randomised controlled trial (RCT)
Study location	Canada
Study setting	Outpatient setting
Study dates	NR
Sources of funding	The project was supported by a "Telerehabilitation for Stroke" grant from the Heart and Stroke Foundation Canadian Partnership for Stroke Recovery. Matching funds were generously provided by the Manitoba Patient Access Network (MPAN).

Inclusion criteria	A history of unilateral stroke resulting in a communication disorder, occurring at least six months in the past; availability of a communication partner to participate in the treatment program; ability to travel to the treatment site if not at home; ability to hear instructions and operate an iPad tablet to perform homework exercises.
Exclusion criteria	History of dementing illness or other neurological disorder.
Recruitment / selection of participants	People were recruited by advertisements and word of mouth.
Intervention(s)	Computer-based tools for speech and language therapy (telerehabilitation) N=22 Weekly 1 hour sessions with the therapist over 10 weeks received in telerehabilitation conditions. People had an initial 2-hour in person meeting with the therapy team which included collection of medical history, informed consent, initial assessments, goal identification, instruction on using the TalkPath software and random assignment of the person to either treatment group. Remote therapy sessions conducted using teleconferencing equipment and software. People possessing adequate equipment at home consulted the therapist using WebEX, a commercial teleconferencing program, except for one person who preferred to use VSee as they were already familiar with it. Three therapy sessions (weeks 3, 6 and 9) had 30 minutes devoted exclusively to the communication partner, giving training on Supported Conversation techniques and helping the partner keep the client on track with the treatment program. Homework exercises were provided including graded exercises in Speaking, Listening, Reading, Writing and paralinguistic cognitive skills including memory. Other homework items included modified script training, sentence patterning, writing exercises and preparing for specific activities including public speaking events. Concomitant therapy: No additional information.
Population subgroups	NR
Subgroup 1 - time after stroke	Chronic (>6 months)
Subgroup 2 - Severity	Unclear/not stated

Subgroup 3 - Minutes/hours of intervention per day	1-2 hours
Subgroup 4 - Number of days of treatment per week	<5 days a week
Subgroup 5 - Focus of care	Communication
Subgroup 6 - Mode of delivery	Videoconferencing
Subgroup 7 - Mode of feedback	Real time communication
Comparator	Speech and language therapy usual care: Same therapy principles but delivered in person. Concomitant therapy: No additional information.
Number of participants	44
Duration of follow-up	10 weeks
Indirectness	NR
Additional comments	NR

1.1.36.2. Study arms

1.1.36.2.1. Computer-based tools for speech and language therapy (telerehabilitation) (N = 22)

Weekly 1 hour sessions with the therapist over 10 weeks received in telerehabilitation conditions. People had an initial 2-hour in person meeting with the therapy team which included collection of medical history, informed consent, initial assessments, goal identification, instruction on using the TalkPath software and random assignment of the person to either treatment group. Remote

therapy sessions conducted using teleconferencing equipment and software. People possessing adequate equipment at home consulted the therapist using WebEX, a commercial teleconferencing program, except for one person who preferred to use VSee as they were already familiar with it. Three therapy sessions (weeks 3, 6 and 9) had 30 minutes devoted exclusively to the communication partner, giving training on Supported Conversation techniques and helping the partner keep the client on track with the treatment program. Homework exercises were provided including graded exercises in Speaking, Listening, Reading, Writing and paralinguistic cognitive skills including memory. Other homework items included modified script training, sentence patterning, writing exercises and preparing for specific activities including public speaking events. Concomitant therapy: No additional information

1.1.36.2.2. Speech and language therapy without computer-based tools (usual care) (N = 22)

Same therapy principles but delivered in person. Concomitant therapy: No additional information.

1.1.36.3. Characteristics

1.1.36.3.1. Study-level characteristics

Characteristic	**Study (N = 44)**
Comorbidities Nominal	NR
Severity Nominal	NR
Focus of care required Nominal	NR

1.1.36.3.2. Arm-level characteristics

Characteristic	Computer-based tools for speech and language therapy (telerehabilitation) (N = 22)	Speech and language therapy without computer-based tools (usual care) (N = 22)
% Female Sample size	n = 9 ; % = 41	n = 8 ; % = 36
Mean age (SD) (years) Mean (SD)	65.4 (11.3)	63 (10.8)
Time period after stroke Mean (SD)	NR (NR)	NR (NR)

1.1.36.4. Outcomes

1.1.36.4.1. Study timepoints

- Baseline
- 10 week

1.1.36.4.2. Continuous outcomes (aphasia group)

Outcome	Computer-based tools for speech and language therapy (telerehabilitation), Baseline, N = 17	Computer-based tools for speech and language therapy (telerehabilitation), 10 week, N = 15	Speech and language therapy without computer-based tools (usual care), Baseline, N = 16	Speech and language therapy without computer-based tools (usual care), 10 week, N = 15
Communication - functional communication Western Aphasia Battery - AQ Scale range: 0-100. Change scores. Mean (SD)	NR (NR)	7.7 (6)	NR (NR)	6.6 (3.9)

Communication - functional communication Western Aphasia Battery - AQ - Polarity - Higher values are better

1.1.36.4.3. Continuous outcomes (cog-ling group)

Outcome	Computer-based tools for speech and language therapy (telerehabilitation), Baseline, N = 5	Computer-based tools for speech and language therapy (telerehabilitation), 10 week, N = 5	Speech and language therapy without computer-based tools (usual care), Baseline, N = 6	Speech and language therapy without computer-based tools (usual care), 10 week, N = 6
Stroke-specific measures of cognition - non-spatial attention and working memory (Cognitive Linguistic Quick Test - Attention) Scale range: 0-215. Change scores. Mean (SD)	NR (NR)	2.4 (17.4)	NR (NR)	25.5 (27.65)

Outcome	Computer-based tools for speech and language therapy (telerehabilitation), Baseline, N = 5	Computer-based tools for speech and language therapy (telerehabilitation), 10 week, N = 5	Speech and language therapy without computer-based tools (usual care), Baseline, N = 6	Speech and language therapy without computer-based tools (usual care), 10 week, N = 6
Stroke-specific measures of cognition - memory (Cognitive Linguistic Quick Test - Memory) Scale range: 0-185. Change scores. Mean (SD)	NR (NR)	17 (11.04)	NR (NR)	19.3 (22.86)
Stroke-specific measures of cognition - executive functions (Cognitive Linguistic Quick Test - Executive function) Scale range: 0-40. Change scores. Mean (SD)	NR (NR)	1.4 (3.85)	NR (NR)	2.9 (1.83)

Stroke-specific measures of cognition - non-spatial attention and working memory (Cognitive Linguistic Quick Test - Attention) - Polarity - Higher values are better
Stroke-specific measures of cognition - memory (Cognitive Linguistic Quick Test - Memory) - Polarity - Higher values are better
Stroke-specific measures of cognition - executive functions (Cognitive Linguistic Quick Test - Executive function) - Polarity - Lower values are better

1.1.36.4.4. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.36.4.5. Continuousoutcomes-Communication-functionalcommunicationWesternAphasiaBattery-AQ-MeanSD-Computer-based tools for speech and language therapy (telerehabilitation)-Speech and language therapy without computer-based tools (usual care)-t10

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.36.4.6. Continuousoutcomes(cog-linggroup)-Stroke-specificmeasuresofcognition-non-spatialattentionandworkingmemory(CognitiveLinguisticQuickTest-Attention)-MeanSD-Computer-based tools for speech and language therapy (telerehabilitation)-Speech and language therapy without computer-based tools (usual care)-t10

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.36.4.7. Continuousoutcomes(cog-linggroup)-Stroke-specificmeasuresofcognition-memory(CognitiveLinguisticQuickTest-Memory)-MeanSD-Computer-based tools for speech and language therapy (telerehabilitation)-Speech and language therapy without computer-based tools (usual care)-t10

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.36.4.8. Continuousoutcomes(cog-linggroup)-Stroke-specificmeasuresofcognition-executivefunctions(CognitiveLinguisticQuickTest-Executivefunction)-MeanSD-Computer-based tools for speech and language therapy (telerehabilitation)-Speech and language therapy without computer-based tools (usual care)-t10

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.37. Ora, 2020

Bibliographic Reference Ora, Hege Prag; Kirmess, Melanie; Brady, Marian C; Partee, Iselin; Hognestad, Randi Bjor; Johannessen, Beate Bertheau; Thommessen, Bente; Becker, Frank; The effect of augmented speech-language therapy delivered by telerehabilitation on poststroke aphasia-a pilot randomized controlled trial.; Clinical rehabilitation; 2020; vol. 34 (no. 3); 369-381

1.1.37.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	NR

Trial name / registration number	NCT02768922
Study type	Randomised controlled trial (RCT)
Study location	Norway
Study setting	Oslo region from stroke units at four different hospitals, from rehabilitation institutions including Sunnaas Rehabilitation Hospital. Community based therapy most commonly at home.
Study dates	May 2016 and ended in May 2018
Sources of funding	The trial is funded by the South-Eastern Norway Regional Health Authority (project number 2015037) and has also received financial support from the University of Oslo and Sunnaas Rehabilitation Hospital. The NMAHP RU and MB is supported by the Chief Scientist Office, part of the Scottish Government Health and Social Care Directorates.
Inclusion criteria	Study inclusion criteria: People with aphasia following stroke (any time post stroke). Aphasia including naming impairment (percentile score of 70 or lower on the Norwegian Basic Aphasia Assessment subtest naming. Norwegian was their main language.
Exclusion criteria	Study exclusion criteria: Age below 16 years. • Patients who were unable to perform five hours of speech-language therapy per week due to medical or cognitive reasons (including moderate to severe hearing or visual impairment). Patients who scored > 70 percentile score on the Norwegian Basic Aphasia Assessment subtest naming. Patients with traumatic brain injury.
Recruitment / selection of participants	Patients were recruited within the Oslo region from stroke units at four different hospitals, from rehabilitation institutions including Sunnaas Rehabilitation Hospital, and from cooperating speech-language pathologists. Staff at recruitment sites screened patients for eligibility, where potential participants received information and an invitation to take part in the trial. The research investigator (HPØ) made an ambulatory visit for further investigations and enrollment.
Intervention(s)	The participants allocated to the telerehabilitation group received augmented language training via videoconference. A mixed approach following best practice was used to design an intervention aiming to enhance functional expressive communication. This included different impairment-based methods like functional-orientated therapy to phonological, semantic, cognitive-linguistic and cognitive neuropsychological approaches. The therapy was tailored to the individual participant's language impairment, needs and goals in all language modalities (reading, writing, spoken language and auditory comprehension). The intervention targeted spoken language with tasks including word production, picture naming and discussion about familiar topics. Materials used in the intervention included a Norwegian translation of the Newcastle University Aphasia Therapy Resources and a computer training program targeting all language modalities called Lexia. We also used "Sareptas afasikrukke", a collection of Norwegian tasks comprising individual aphasia exercises training all

	modalities, e.g. oral and written naming, reading sentences and text. There were three speech-language pathologists that delivered the telerehabilitation intervention. A telerehabilitation intervention of five hours a week in line with current Norwegian national guidelines was chosen. The therapy was delivered via videoconference over four consecutive weeks. Participants were required to complete ≥ 16 sessions of speech-language therapy via videoconference over 32 days in order to secure therapy time as defined per protocol , and account for any expected logistic or technical challenges, as well as medical complications or co-morbidities. As telerehabilitation was given in addition to usual speech language therapy, the total amount of hours of therapy delivered depended on the rehabilitation resources available in local settings. The telerehabilitation was given by a speech-language pathologist using videoconference through internet from Sunnaas Rehabilitation Hospital to a study laptop in the participant's home or in the rehabilitation ward where the participant was admitted. Participants were given training in the use of the computer software usually lasting for 30-60 minutes. Concomitant therapy: All trial participants received usual care during the study period provided by local speechlanguage pathologists at the community level and/or in a rehabilitation institution.
Population subgroups	NR
Subgroup 1 - time after stroke	Subacute (7 days - 6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	1-2 hours
Subgroup 4 - Number of days of treatment per week	5 days per week
Subgroup 5 - Focus of care	Communication

Subgroup 6 - Mode of delivery	Videoconferencing
Subgroup 7 - Mode of feedback	Real time communication
Comparator	All trial participants received usual care during the study period provided by local speechlanguage pathologists at the community level and/or in a rehabilitation institution. Participants who were allocated to the control group did not receive any project specific intervention. Due to the nature of the telerehabilitation intervention and the usual care delivered, the speech-language pathologists delivering the intervention and the participants were not blinded to treatment allocation. The dosage of usual care measured by hours from inclusion to follow-up assessment was recorded in a log-form. The log was piloted in cooperation with the participant's family/caregivers. Information on dosage was also retrieved from the speech-language pathologists providing the usual care and through participants' journal during and/or after completion of the trial.
Number of participants	62
Duration of follow-up	4 weeks and 4 months
Indirectness	NR
Additional comments	NR

1.1.37.2. Study arms

1.1.37.2.1. speech and language telerehabilitation (N = 32)

A SALT telerehabilitation intervention of five hours a week in line with current Norwegian national guidelines was chosen. The therapy was delivered via videoconference over four consecutive weeks. Participants were required to complete ≥ 16 sessions of speech-language therapy via videoconference over 32 days.

1.1.37.2.2. Usual care (N = 30)

All trial participants received usual care during the study period provided by local speechlanguage pathologists at the community level and/or in a rehabilitation institution. Participants who were allocated to the control group did not receive any project specific

intervention. Due to the nature of the telerehabilitation intervention and the usual care delivered, the speech-language pathologists delivering the intervention and the participants were not blinded to treatment allocation. The dosage of usual care measured by hours from inclusion to follow-up assessment was recorded in a log-form. The log was piloted in cooperation with the participant's family/caregivers. Information on dosage was also retrieved from the speech-language pathologists providing the usual care and through participants' journal during and/or after completion of the trial.

1.1.37.3. Characteristics

1.1.37.3.1. Study-level characteristics

Characteristic	Study (N = 62)
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Severity Nominal	NR
Focus of care required Nominal	NR

1.1.37.3.2. Arm-level characteristics

Characteristic	speech and language telerehabilitation (N = 32)	Usual care (N = 30)
% Female	n = 13 ; % = 40.6	n = 8 ; % = 26.7

Characteristic	speech and language telerehabilitation (N = 32)	Usual care (N = 30)
Sample size		
Mean age (SD) Mean (SD)	64.7 (11.7)	65 (12.2)
Time period after stroke Sample size	n = NR ; % = NR	n = NR ; % = NR
</=3 months Sample size	n = 16 ; % = 50	n = 12 ; % = 40
3-12 months Sample size	n = 5 ; % = 15.6	n = 4 ; % = 13.3
12 months Sample size	n = 11 ; % = 34.4	n = 14 ; % = 46.7

1.1.37.4. Outcomes

1.1.37.4.1. Study timepoints

- Baseline
- 16 week

1.1.37.4.2. Dichotomous outcomes

Outcome	speech and language telerehabilitation, Baseline, N = 32	speech and language telerehabilitation, 16 week, N = 32	Usual care, Baseline, N = 30	Usual care, 16 week, N = 30
Withdrawal due to adverse events 1 died No of events	n = 0 ; % = 0	n = 0 ; % = 0	n = 0 ; % = 0	n = 0 ; % = 0

Withdrawal due to adverse events - Polarity - Lower values are better

1.1.37.4.3. Continuous outcome (mean difference)

Outcome	speech and language telerehabilitation vs Usual care, Baseline, N2 = 32, N1 = 30	speech and language telerehabilitation vs Usual care, 16 week, N2 = 32, N1 = 30
Functional communication (communicative effectiveness index) Scale range: 0-100. Mean difference calculated from final values. Mean (95% CI)	NR (NR to NR)	-0.03 (-12.2 to 12.1)

Functional communication (communicative effectiveness index) - Polarity - Higher values are better

1.1.37.4.4. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.37.4.5. Dichotomousoutcomes-Withdrawalduetoadverseevents-NoOfEvents-speech and language telerehabilitation-Usual care-t16

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low
Overall bias and Directness	Overall Directness	Directly applicable

1.1.37.4.6. Continuousoutcome(meandifference)-Functionalcommunication(communicativeeffectivenessindex)-MeanNineFivePercentCI-speech and language telerehabilitation-Usual care-t16

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low
Overall bias and Directness	Overall Directness	Directly applicable

1.1.38. Piron, 2009

Bibliographic Reference	Piron, Lamberto; Turolla, Andrea; Agostini, Michela; Zucconi, Carla; Cortese, Feliciana; Zampolini, Mauro; Zannini, Mara; Dam, Mauro; Ventura, Laura; Battauz, Michela; Tonin, Paolo; Exercises for paretic upper limb after stroke: a combined virtual-reality and telemedicine approach.; Journal of rehabilitation medicine; 2009; vol. 41 (no. 12); 1016-102

1.1.38.1. Study details

Secondary publication of	NR

another included study- see primary study for details	
Other publications associated with this study included in review	This paper was included in the Cochrane review that this review was based on: Laver KE, Adey-Wakeling Z, Crotty M, Lannin NA, George S, Sherrington C. Telerehabilitation services for stroke. Cochrane Database of Systematic Reviews 2020, Issue 1. Art. No.: CD010255. For further information about the data extraction please see the Cochrane review.
Trial name / registration number	Nr
Study type	Randomised controlled trial (RCT)
Study location	Italy
Study setting	Rehabilitation hospital and home based
Study dates	NR
Sources of funding	NR
Inclusion criteria	Inclusion criteria: single ischaemic stroke in the middle cerebral artery region with mild to intermediate arm motor impairment (Fugl-Meyer Upper Extremity Scale score 30 to 55)
Exclusion criteria	Exclusion criteria: clinical evidence of cognitive impairment, apraxia (< 62 points on the 'De Renzi' test), neglect or language disturbance interfering with verbal comprehension (> 40 errors on the Token test)
Recruitment / selection of participants	NR
Intervention(s)	Telerehabilitation intervention: the virtual reality telerehabilitation programme used 1 computer workstation at the participant’s home and 1 at the rehabilitation hospital. The system used a 3D motion tracking system to record arm movements through a magnetic receiver into a virtual image. The participant moved a real object by following the trajectory of a virtual object displayed on the screen in accordance with the requested virtual task. 5 virtual tasks comprising simple arm movements were devised for training

Population subgroups	NR
Subgroup 1 - time after stroke	Chronic (>6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	1-2 hours
Subgroup 4 - Number of days of treatment per week	5 days per week
Subgroup 5 - Focus of care	Upper limb
Subgroup 6 - Mode of delivery	Videoconferencing
Subgroup 7 - Mode of feedback	Real time communication
Comparator	Control intervention: specific exercises for the upper limb with progressive complexity. Started with control of isolated movements without postural control, then postural control including touching different targets and manipulating objects. Sessions were 60 minutes, 5 times per week for 4 weeks (20 hours total).
Number of participants	36
Duration of follow-up	1 month and 2 months
Indirectness	NR
Additional comments	Nr

1.1.38.2. Study arms

1.1.38.2.1. Virtual reality telerehabilitation (N = 18)

Telerehabilitation intervention: the virtual reality telerehabilitation programme used 1 computer workstation at the participant's home and 1 at the rehabilitation hospital. The system used a 3D motion tracking system to record arm movements through a magnetic receiver into a virtual image. The participant moved a real object by following the trajectory of a virtual object displayed on the screen in accordance with the requested virtual task. 5 virtual tasks comprising simple arm movements were devised for training

1.1.38.2.2. conventional physical therapy (N = 18)

Control intervention: specific exercises for the upper limb with progressive complexity. Started with control of isolated movements without postural control, then postural control including touching different targets and manipulating objects. Sessions were 60 minutes, 5 times per week for 4 weeks (20 hours total).

1.1.38.3. Characteristics

1.1.38.3.1. Study-level characteristics

Characteristic	**Study (N = 36)**
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Severity Nominal	NR

Characteristic	Study (N = 36)
Focus of care required Nominal	NR

1.1.38.3.2. Arm-level characteristics

Characteristic	Virtual reality telerehabilitation (N = 18)	conventional physical therapy (N = 18)
% Female Sample size	n = 7 ; % = 38.9	n = 8 ; % = 44.4
Mean age (SD) Mean (SD)	66 (7.9)	64.4 (7.9)
Time period after stroke months Mean (SD)	14.7 (6.6)	11.9 (3.7)

1.1.38.4. Outcomes

1.1.38.4.1. Study timepoints

- Baseline
- 2 month

1.1.38.4.2. Continuous outcomes

Outcome	Virtual reality telerehabilitation, Baseline, N = 18	Virtual reality telerehabilitation, 2 month, N = 18	conventional physical therapy, Baseline, N = 18	conventional physical therapy, 2 month, N = 18
Physical function - upper limb (Fugl Meyer Assessment Upper Limb) Scale range: 0-66. Final values. Mean (SD)	48.3 (7.2)	53.1 (7.3)	47.3 (4.5)	48.8 (5.1)

Physical function - upper limb (Fugl Meyer Assessment Upper Limb) - Polarity - Higher values are better

1.1.38.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.38.4.4. Continuousoutcomes-Physicalfunction-upperlimb-FMAupperlimb-MeanSD-Virtual reality telerehabilitation-conventional physical therapy-t2

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low
Overall bias and Directness	Overall Directness	Directly applicable

1.1.39. Piron, 2008

Bibliographic Reference	Piron, Lamberto; Turolla, Andrea; Tonin, Paolo; Piccione, Francesco; Lain, Lisa; Dam, Mauro; Satisfaction with care in post-stroke patients undergoing a telerehabilitation programme at home.; Journal of telemedicine and telecare; 2008; vol. 14 (no. 5); 257-60

1.1.39.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	This paper was included in the Cochrane review that this review was based on: Laver KE, Adey-Wakeling Z, Crotty M, Lannin NA, George S, Sherrington C. Telerehabilitation services for stroke. Cochrane Database of Systematic Reviews 2020, Issue 1. Art. No.: CD010255. For further information about the data extraction please see the Cochrane review.
Trial name / registration number	NR
Study type	Randomised controlled trial (RCT)
Study location	Italy
Study setting	home based
Study dates	NR
Sources of funding	The project was supported by the Veneto Region, Italy.
Inclusion criteria	Inclusion criteria: mild to intermediate arm motor impairment due to ischaemic stroke in the area of the middle cerebral artery; without cognitive problems that could interfere with comprehension
Exclusion criteria	Exclusion criteria: failure to meet above criteria
Recruitment / selection of participants	NR

Intervention(s)	Telerehabilitation intervention: the purpose of the intervention was to improve upper limb function using a virtual reality programme. Patient-therapist interaction facilitated by a videoconferencing unit beside the telerehabilitation equipment. 1 computer was at the hospital and 1 at the participant's home
Population subgroups	NR
Subgroup 1 - time after stroke	Chronic (>6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	1-2 hours
Subgroup 4 - Number of days of treatment per week	7 days a week
Subgroup 5 - Focus of care	Upper limb
Subgroup 6 - Mode of delivery	Videoconferencing
Subgroup 7 - Mode of feedback	Real time communication
Comparator	Control intervention: virtual reality workstation with a 3D motion tracking system that recorded the participant's arm movements. The participant's movement was represented in the virtual environment. The therapist created a sequence of virtual tasks for the participant to complete with the affected arm. Participants could see their own trajectory and the ideal/desired trajectory.
Number of participants	10
Duration of follow-up	1 month

Indirectness	NR
Additional comments	NR

1.1.39.2. Study arms

1.1.39.2.1. VR Telerehabilitation (N = 5)

Telerehabilitation intervention: the purpose of the intervention was to improve upper limb function using a virtual reality programme. Patient-therapist interaction facilitated by a videoconferencing unit beside the telerehabilitation equipment. 1 computer was at the hospital and 1 at the participant's home

1.1.39.2.2. VR with therapist (N = 5)

Control intervention: virtual reality workstation with a 3D motion tracking system that recorded the participant's arm movements. The participant's movement was represented in the virtual environment. The therapist created a sequence of virtual tasks for the participant to complete with the affected arm. Participants could see their own trajectory and the ideal/desired trajectory.

1.1.39.3. Characteristics

1.1.39.3.1. Study-level characteristics

Characteristic	**Study (N = 10)**
Ethnicity Nominal	NR
Comorbidities Nominal	NR

Characteristic	Study (N = 10)
Severity Nominal	NR
Focus of care required Nominal	NR

1.1.39.3.2. Arm-level characteristics

Characteristic	VR Telerehabilitation (N = 5)	VR with therapist (N = 5)
% Female Sample size	n = 3 ; % = 60	n = 2 ; % = 40
Mean age (SD) Mean (SD)	53 (15)	65 (11)
Time period after stroke Mean (SD)	10 (3)	13 (2)

1.1.39.4. Outcomes

1.1.39.4.1. Study timepoints

- Baseline
- 1 month

1.1.39.4.2. Continuous outcomes

Outcome	VR Telerehabilitation , Baseline, N = 5	VR Telerehabilitation , 1 month, N = 5	VR with therapist, Baseline, N = 5	VR with therapist, 1 month, N = 5
Physical function - upper limb FMA - UE Scale range: 0-66. Final values. Values taken directly from the Cochrane review as likely from unpublished data Mean (SD)	NR (NR)	56.6 (8.9)	NR (NR)	56 (8.7)

Physical function - upper limb FMA - UE - Polarity - Higher values are better

1.1.39.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.39.4.4. Continuousoutcomes-Physicalfunction-upperlimbFMA-UE-MeanSD-VR Telerehabilitation -VR with therapist-t1

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.40. Salgueiro, 2022

Bibliographic Reference	Salgueiro, Carina; Urrutia, Gerard; Cabanas-Valdes, Rosa; Influence of Core-Stability Exercises Guided by a Telerehabilitation App on Trunk Performance, Balance and Gait Performance in Chronic Stroke Survivors: A Preliminary Randomized Controlled Trial.; International journal of environmental research and public health; 2022; vol. 19 (no. 9)

1.1.40.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	NR
Trial name / registration number	(NCT04477252)
Study type	Randomised controlled trial (RCT)
Study location	Spain
Study setting	Neurorehabilitation Clinic in Barcelona, then home based
Study dates	NR
Sources of funding	This research was partial funded by Fundació Marató de TV3, grant number 201737-83.
Inclusion criteria	The inclusion criteria for this study included medical diagnosis of stroke with cortical or subcortical, ischemic or hemorrhagic involvement with more than 6 months of recovery, clinical symptoms of hemiplegia or hemiparesis, being over 18 years of age, have the ability to understand and execute simple instructions, a score equal to or less than 10 in the Spanish version of the Trunk Impairment Scale 2.0 (S-TIS2.0) and be a frequent user of smartphones or tablets (a family member or caregiver could be considered).
Exclusion criteria	The exclusion criteria were presence of any neurological or neuromuscular disease or worsening of any of the comorbidities, to suffer another episode of stroke and fractures or important structural alterations in any of the lower limbs (e.g., orthopedic problem of the lower limbs). Individuals with aphasia but capable of understanding and executing simple commands were included with prior consultation with the respective neuropsychologist or speech therapist.

Recruitment / selection of participants	All eligible participants were recruited from the Neurorehabilitation Clinic
Intervention(s)	In addition to conventional physiotherapy, participants had individual access to the Farmalarm App as a telerehabilitation tool to guide adapted home-based core stability exercise (CSE). The Farmalarm App (Inmovens Solution, Barcelona, Spain) was specifically adapted for this study. Although the exercises should be personalized for each user, in this study phase the CSE guide introduced in the App was common. Users have been able to voluntarily access the exercises guide (description, photo and video) and to confirm its performance. Participants were asked to perform 10 repetitions of each of the 32 exercises proposed in the program and were encouraged to perform as many exercises as possible, respecting their perception of tiredness, taking as many breaks as they found necessary. The exercises were introduced in order of difficulty, from the supine position to a seated position on an unstable base. Although the exercises were always presented in the same order, the participants were free to navigate through the menu of the exercises choosing the order they preferred or skipping the exercises that they could not perform or did not feel safe to do so. CSE program to be carried out at home with the help of the App for 12 weeks, 5 days a week. The participants were contacted by phone on a regular basis to ensure that they did not have problems with the use of the App. Concomittant therapy: Both groups (CG and EG) underwent the conventional physiotherapy. It consisted of one-hour face-to-face session of therapeutic techniques such as muscle stretching to reduce hypertonicity or spasticity, passive and functional mobilization of body segments affected by stroke, practice of sitting and standing posture and gait, task and aerobic training as cycling or treadmill training. The techniques used were chosen at the discretion of the physiotherapist in charge following the clinical practice guidelines. The intervention was totally adapted and personalized to the needs and capacities of the patient. Participants maintained their usual dose of treatment during participation in this study. In accordance with clinical recommendations the mean frequency of the sessions was 1 h two times a week for 12 weeks. The physiotherapy sessions were face-to-face and individualized under the responsibility of a physiotherapist with special training and more than 2 years of work experience in neurorehabilitation.
Population subgroups	NR
Subgroup 1 - time after stroke	Chronic (>6 months)
Subgroup 2 - Severity	Unclear/not stated

Subgroup 3 - Minutes/hours of intervention per day	Unclear/not stated
Subgroup 4 - Number of days of treatment per week	5 days per week
Subgroup 5 - Focus of care	Core stability
Subgroup 6 - Mode of delivery	Telephone
Subgroup 7 - Mode of feedback	Real time communication
Comparator	Conventional physiotherapy: It consisted of one-hour face-to-face session of therapeutic techniques such as muscle stretching to reduce hypertonicity or spasticity, passive and functional mobilization of body segments affected by stroke, practice of sitting and standing posture and gait, task and aerobic training as cycling or treadmill training. The techniques used were chosen at the discretion of the physiotherapist in charge following the clinical practice guidelines. The intervention was totally adapted and personalized to the needs and capacities of the patient. Participants maintained their usual dose of treatment during participation in this study. In accordance with clinical recommendations the mean frequency of the sessions was 1 h two times a week for 12 weeks. The physiotherapy sessions were face-to-face and individualized under the responsibility of a physiotherapist with special training and more than 2 years of work experience in neurorehabilitation.
Number of participants	30
Duration of follow-up	12 weeks
Indirectness	NR

1.1.40.2. Study arms

1.1.40.2.1. Telerehabilitation for core stability (N = 15)

In addition to conventional physiotherapy, participants had individual access to the Farmalarm App as a telerehabilitation tool to guide adapted home-based core stability exercise (CSE). The Farmalarm App (Inmovens Solution, Barcelona, Spain) was specifically adapted for this study. Although the exercises should be personalized for each user, in this study phase the CSE guide introduced in the App was common. Users have been able to voluntarily access the exercises guide (description, photo and video) and to confirm its performance. Participants were asked to perform 10 repetitions of each of the 32 exercises proposed in the program and were encouraged to perform as many exercises as possible, respecting their perception of tiredness, taking as many breaks as they found necessary. The exercises were introduced in order of difficulty, from the supine position to a seated position on an unstable base. Although the exercises were always presented in the same order, the participants were free to navigate through the menu of the exercises choosing the order they preferred or skipping the exercises that they could not perform or did not feel safe to do so. CSE program to be carried out at home with the help of the App for 12 weeks, 5 days a week. The participants were contacted by phone on a regular basis to ensure that they did not have problems with the use of the App. Concomittant therapy: Both groups (CG and EG) underwent the conventional physiotherapy. It consisted of one-hour face-to-face session of therapeutic techniques such as muscle stretching to reduce hypertonicity or spasticity, passive and functional mobilization of body segments affected by stroke, practice of sitting and standing posture and gait, task and aerobic training as cycling or treadmill training. The techniques used were chosen at the discretion of the physiotherapist in charge following the clinical practice guidelines. The intervention was totally adapted and personalized to the needs and capacities of the patient. Participants maintained their usual dose of treatment during participation in this study. In accordance with clinical recommendations the mean frequency of the sessions was 1 h two times a week for 12 weeks. The physiotherapy sessions were face-to-face and individualized under the responsibility of a physiotherapist with special training and more than 2 years of work experience in neurorehabilitation.

1.1.40.2.2. Conventional physiotherapy (N = 15)

Conventional physiotherapy: It consisted of one-hour face-to-face session of therapeutic techniques such as muscle stretching to reduce hypertonicity or spasticity, passive and functional mobilization of body segments affected by stroke, practice of sitting and standing posture and gait, task and aerobic training as cycling or treadmill training. The techniques used were chosen at the discretion of the physiotherapist in charge following the clinical practice guidelines. The intervention was totally adapted and personalized to the needs and capacities of the patient. Participants maintained their usual dose of treatment during participation in this study. In accordance with clinical recommendations the mean frequency of the sessions was 1 h two times a week for 12 weeks. The

physiotherapy sessions were face-to-face and individualized under the responsibility of a physiotherapist with special training and more than 2 years of work experience in neurorehabilitation.

1.1.40.3. Characteristics

1.1.40.3.1. Study-level characteristics

Characteristic	**Study (N = 30)**
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Severity Nominal	NR
Focus of care required Nominal	NR

1.1.40.3.2. Arm-level characteristics

Characteristic	**Telerehabilitation for core stability (N = 15)**	**Conventional physiotherapy (N = 15)**
% Female Sample size	n = 5 ; % = 33.3	n = 5 ; % = 33.3
Mean age (SD)	57.27 (3.38)	64.53 (9.4)

Characteristic	Telerehabilitation for core stability (N = 15)	Conventional physiotherapy (N = 15)
Mean (SD)		
Time period after stroke (years) Mean (SD)	4.61 (3.38)	4.06 (4.43)

1.1.40.4. Outcomes

1.1.40.4.1. Study timepoints

- Baseline
- 12 week

1.1.40.4.2. Continuous outcomes (baseline values)

Outcome	Telerehabilitation for core stability, Baseline, N = 15	Telerehabilitation for core stability, 12 week, N = 15	Conventional physiotherapy, Baseline, N = 15	Conventional physiotherapy, 12 week, N = 15
Balance (Berg Balance Scale) Scale range: 0-56. Change scores. Mean (SD)	43.2 (12.73)	1.93 (2.95)	41.27 (15.42)	2.46 (2.85)
Mobility (walking speed) (m/s) Change scores Mean (SD)	0.36 (0.35)	-0.08 (0.45)	0.39 (0.38)	0.01 (0.05)

Balance (Berg Balance Scale) - Polarity - Higher values are better
Mobility (walking speed) - Polarity - Higher values are better

1.1.40.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.40.4.4. Continuousoutcomes-Balance(BergBalanceScale)changescore-MeanSD-Telerehabilitation for core stability-Conventional physiotherapy-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.40.4.5. Continuousoutcomes(baselinevalues)-Mobility(walkingspeed)-MeanSD-Telerehabilitation for core stability-Conventional physiotherapy-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.41. Salgueiro, 2022

Bibliographic Reference	Salgueiro, Carina; Urrutia, Gerard; Cabanas-Valdes, Rosa; Telerehabilitation for balance rehabilitation in the subacute stage of stroke: A pilot controlled trial.; NeuroRehabilitation; 2022; vol. 51 (no. 1); 91-99

1.1.41.1. Study details

Secondary publication of another included study- see primary study for details	No additional information.
Other publications associated with this study included in review	No additional information.
Trial name / registration number	No additional information.
Study type	Randomised controlled trial (RCT)
Study location	Spain.
Study setting	People from 4 hospitals in Catalonia, Spain. People received telerehabilitation care after discharge from hospital and return to home.
Study dates	March 2019 to April 2021.
Sources of funding	INMovens Solutions S.L., the Hospital Vall d'Hebron (Barcelona) research team and the Institut de Recerca de l'Hospital de la Santa Creu i Sant Pau research team provided technical support and expenses related to it (Marato TV3 Telethon grant: 201737-10).
Inclusion criteria	People who participated in a randomised controlled trial comparing conventional physiotherapy to core stability exercises at the moment of hospital discharge and return to home if they or the caregiver were regular users of a smartphone.
Exclusion criteria	People with worsening of their stroke symptoms; any of the comorbidities (e.g. another neurological disease or orthopaedic problem of the lower limbs); suffering another stroke or fracture of any of the lower limbs or presenting important structural alterations.
Recruitment / selection of participants	People who had previously participated in a 5-week randomised controlled trial comparing conventional physiotherapy versus core stability exercises.

Intervention(s)	Telerehabilitation (balance rehabilitation) N=20 People had individual access to the "Farmalarm" App (instructions and private usernames and passwords) as a telerehabilitation tool to guide home-based core stability exercises. Users can voluntarily access exercise guides on demand and confirm and evaluate their performance. The core stability exercise program proposed in the "Farmalarm" App was known to people because they had used it previously during their hospital stay. All exercises were produced by an experienced neurologic physiotherapist who were available for video calls using the App. The principle researcher had access to the administrator panel of the app for individual monitoring of each user and contacted them by phone call to encourage the use of the application and to clarify any possible doubts. Concomitant therapy: Usual care was available to all (no additional information).
Population subgroups	No additional information.
Subgroup 1 - time after stroke	Unclear/not stated
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	Unclear/not stated
Subgroup 4 - Number of days of treatment per week	Unclear/not stated
Subgroup 5 - Focus of care	Lower limb
Subgroup 6 - Mode of delivery	Telephone

Subgroup 7 - Mode of feedback	Real time communication
Comparator	Usual care N=29 Usual care (no additional information). Concomitant information: Usual care was available to all (no additional information).
Number of participants	49
Duration of follow-up	3 months
Indirectness	No additional information
Additional comments	Method of analysis unclear, appears to be completers only.

1.1.41.2. Study arms

1.1.41.2.1. Telerehabilitation (balance rehabilitation) (N = 20)

People had individual access to the "Farmalarm" App (instructions and private usernames and passwords) as a telerehabilitation tool to guide home-based core stability exercises. Users can voluntarily access exercise guides on demand and confirm and evaluate their performance. The core stability exercise program proposed in the "Farmalarm" App was known to people because they had used it previously during their hospital stay. All exercises were produced by an experienced neurologic physiotherapist who were available for video calls using the App. The principle researcher had access to the administrator panel of the app for individual monitoring of each user and contacted them by phone call to encourage the use of the application and to clarify any possible doubts. Concomitant therapy: Usual care was available to all (no additional information).

1.1.41.2.2. Usual care (N = 29)

Usual care (no additional information). Concomitant information: Usual care was available to all (no additional information).

1.1.41.3. Characteristics

1.1.41.3.1. Arm-level characteristics

Characteristic	Telerehabilitation (balance rehabilitation) (N = 20)	Usual care (N = 29)
% Female Sample size	n = 6 ; % = 31.58	n = 12 ; % = 41.38
Mean age (SD) (years) Mean (SD)	71.58 (10.72)	70.68 (14.08)
Ethnicity Sample size	n = NR ; % = NR	n = NR ; % = NR
Comorbidities Sample size	n = NR ; % = NR	n = NR ; % = NR
Time period after stroke Mean (SD)	NR (NR)	NR (NR)
Severity Mean (SD)	NR (NR)	NR (NR)
Focus of care required Sample size	n = NR ; % = NR	n = NR ; % = NR

1.1.41.4. Outcomes

1.1.41.4.1. Study timepoints

- Baseline
- 3 month (<6 months)

1.1.41.4.2. Continuous outcomes

Outcome	Telerehabilitation (balance rehabilitation), Baseline, N = 16	Telerehabilitation (balance rehabilitation), 3 month, N = 13	Usual care, Baseline, N = 27	Usual care, 3 month, N = 25
Mobility (Spanish version of Trunk Impairment Scale 2.0) Scale range: 0-16. Final values. Mean (SD)	8.6 (4.91)	9.55 (3.67)	9.3 (4.3)	9.95 (4.75)
Balance (Berg Balance Scale) Scale range: 0-56. Final values. Mean (SD)	21.56 (22.19)	31.36 (22.11)	34.96 (17.62)	31.95 (19.28)

Mobility (Spanish version of Trunk Impairment Scale 2.0) - Polarity - Higher values are better
Balance (Berg Balance Scale) - Polarity - Higher values are better

1.1.41.4.3. Dichotomous outcomes

Outcome	Telerehabilitation (balance rehabilitation), Baseline, N = 16	Telerehabilitation (balance rehabilitation), 3 month, N = 13	Usual care, Baseline, N = 27	Usual care, 3 month, N = 25
Withdrawal due to adverse events	n = NA ; % = NA	n = 3 ; % = 23.1	n = NA ; % = NA	n = 1 ; % = 4

Outcome	Telerehabilitation (balance rehabilitation), Baseline, N = 16	Telerehabilitation (balance rehabilitation), 3 month, N = 13	Usual care, Baseline, N = 27	Usual care, 3 month, N = 25
Intervention: 2 death, 1 clinical complication. Control: 1 death. No of events				

Withdrawal due to adverse events - Polarity - Lower values are better

1.1.41.4.4. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.41.4.5. Continuousoutcomes-Mobility(SpanishversionofTrunkImpairmentScale2.0)-MeanSD-Telerehabilitation (balance rehabilitation)-Usual care-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.41.4.6. Continuousoutcomes-Balance(BergBalanceScale)-MeanSD-Telerehabilitation (balance rehabilitation)-Usual care-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.41.4.7. Dichotomousoutcomes-Withdrawalduetoadverseevents-NoOfEvents-Telerehabilitation (balance rehabilitation)-Usual care-t3

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.42. Saywell, 2021

Bibliographic Reference	Saywell, Nicola L; Vandal, Alain C; Mudge, Suzie; Hale, Leigh; Brown, Paul; Feigin, Valery; Hanger, Carl; Taylor, Denise; Telerehabilitation After Stroke Using Readily Available Technology: A Randomized Controlled Trial.; Neurorehabilitation and neural repair; 2021; vol. 35 (no. 1); 88-97

1.1.42.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	NR
Trial name / registration number	NR
Study type	Randomised controlled trial (RCT)

Study location	New Zealand
Study setting	4 community stroke rehabilitation centers across New Zealand
Study dates	NR
Sources of funding	The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The Health Research Council of New Zealand 11/545.
Inclusion criteria	The inclusion criteria were as follows: adults aged >20 years who had experienced a first-ever hemispheric stroke of hemorrhagic or ischemic origin and were discharged from inpatient, outpatient, or community physiotherapy services to live in their own home.
Exclusion criteria	Exclusion criteria were a confirmed brain stem or cerebellar stroke or inability to understand and speak basic-level English.
Recruitment / selection of participants	Potential participants received telephone screening to determine eligibility 7 to 10 days after receiving the trial information. Those who were not able to be contacted were telephoned on at least 7 occasions, on different days, at different times of the day, over a 2-week period before being excluded from the trial.
Intervention(s)	Augmented Community Telerehabilitation Intervention: ACTIV focused on 2 functional categories: “staying upright” and “using your arm.” The program was delivered by physical therapists who had completed ACTIV training. The physical therapists established patient-centered goals at the first home visit. Next, they selected exercises and activities to address these goals, accessing advice from an expert neurological physical therapist if required. Each participant received 4 face-to face visits, 5 structured phone calls, and personalized text messages. The phone calls focused on helping participants formulate a strategy to maximize their engagement in the program. For example, the physical therapist had a copy of the participant’s exercise chart, so they knew the participant’s current exercise plan and were able to address any reported difficulty with exercise completion. They could also clarify exercise instructions or implement a change in the level of challenge by altering exercise parameters. Text messages were used to encourage continuation of exercises and acknowledge participants’ progress
Population subgroups	NR
Subgroup 1 - time after stroke	Chronic (>6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of	Unclear/not stated

intervention per day	
Subgroup 4 - Number of days of treatment per week	<5 days a week
Subgroup 5 - Focus of care	Upper limb Lower limb
Subgroup 6 - Mode of delivery	Telephone
Comparator	Usual care: Standard care following discharge from rehabilitation services in New Zealand usually means no further formal rehabilitation. To ensure usual care, no attempt was made to discourage any additional care, and this was not measured.
Number of participants	95
Duration of follow-up	6 months and 12 months
Indirectness	NR
Additional comments	NR

1.1.42.2. Study arms

1.1.42.2.1. Augmented Community Telerehabilitation Intervention (N = 47)

ACTIV focused on 2 functional categories: “staying upright” and “using your arm.” The program was delivered by physical therapists who had completed ACTIV training. The physical therapists established patient-centered goals at the first home visit. Next, they selected exercises and activities to address these goals, accessing advice from an expert neurological physical therapist if required. Each participant received 4 face-to face visits, 5 structured phone calls, and personalized text messages. The phone calls focused on helping participants formulate a strategy to maximize their engagement in the program. For example, the physical therapist had a copy of the participant’s exercise chart, so they knew the participant’s current exercise plan and were able to address any reported difficulty

with exercise completion. They could also clarify exercise instructions or implement a change in the level of challenge by altering exercise parameters. Text messages were used to encourage continuation of exercises and acknowledge participants' progress.

1.1.42.2.2. Usual care (N = 48)

Standard care following discharge from rehabilitation services in New Zealand usually means no further formal rehabilitation. To ensure usual care, no attempt was made to discourage any additional care, and this was not measured.

1.1.42.3. Characteristics

1.1.42.3.1. Study-level characteristics

Characteristic	Study (N = 95)
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Severity Nominal	NR
Focus of care required Nominal	NR

1.1.42.3.2. Arm-level characteristics

Characteristic	Augmented Community Telerehabilitation Intervention (N = 47)	Usual care (N = 48)
% Female No of events	n = 24 ; % = 51	n = 22 ; % = 48
Mean age (SD) Mean (SD)	74.1 (11.7)	72.9 (11.7)
Time period after stroke Mean (SD)	7.2 (*empty data*)	6.1 (2.8)

1.1.42.4. Outcomes

1.1.42.4.1. Study timepoints

- Baseline
- 6 month
- 12 month

1.1.42.4.2. Continuous outcomes

Outcome	Augmented Community Telerehabilitation Intervention, Baseline, N = 45	Augmented Community Telerehabilitation Intervention, 6 month, N = 38	Augmented Community Telerehabilitation Intervention, 12 month, N = 35	Usual care, Baseline, N = 48	Usual care, 6 month, N = 41	Usual care, 12 month, N = 40
Person/participant generic health related quality of life (EQ5D	69.9 (18)	76.2 (17.8)	62.9 (25.6)	60.3 (19.7)	62.4 (25.7)	69.2 (20.4)

Outcome	Augmented Community Telerehabilitation Intervention, Baseline, N = 45	Augmented Community Telerehabilitation Intervention, 6 month, N = 38	Augmented Community Telerehabilitation Intervention, 12 month, N = 35	Usual care, Baseline, N = 48	Usual care, 6 month, N = 41	Usual care, 12 month, N = 40
VAS) Scale range: 0-100. Final values. Mean (SD)						

Person/participant generic health related quality of life (EQ5D VAS) - Polarity - Higher values are better

1.1.42.4.3. Dichotomous outcomes

Outcome	Augmented Community Telerehabilitation Intervention, Baseline, N = 47	Augmented Community Telerehabilitation Intervention, 6 month, N = 47	Augmented Community Telerehabilitation Intervention, 12 month, N = 47	Usual care, Baseline, N = 48	Usual care, 6 month, N = 48	Usual care, 12 month, N = 48
Withdrawal due to adverse events intervention = 2 poor health, control = 1 poor health and 1 died No of events	n = NR ; % = NR	n = NR ; % = NR	n = 2 ; % = 4.2	n = NR ; % = NR	n = NR ; % = NR	n = 2 ; % = 4.2

Withdrawal due to adverse events - Polarity - Lower values are better

1.1.42.4.4. Continuous outcomes 2

Outcome	Augmented Community Telerehabilitation Intervention, Baseline, N = 47	Augmented Community Telerehabilitation Intervention, 6 month, N = 39	Augmented Community Telerehabilitation Intervention, 12 month, N = 35	Usual care, Baseline, N = 48	Usual care, 6 month, N = 44	Usual care, 12 month, N = 40
Stroke-specific Patient-Reported Outcome Measure (Stroke impact scale) Scale range: 0-100. Final values. Mean (SD)	58.5 (19.5)	67.3 (21.3)	64.9 (20.4)	53.5 (20.1)	61.8 (19.6)	61.8 (22.7)
Balance (step test) (Number of steps) Affected lower limbs. Final values. Mean (SD)	7.4 (4.5)	7.9 (4.9)	7.5 (5.6)	7.1 (5.4)	7.4 (6.1)	7.2 (5.9)

Stroke-specific Patient-Reported Outcome Measure (Stroke impact scale) - Polarity - Higher values are better
Balance (step test) - Polarity - Higher values are better

1.1.42.4.5. Continuous outcome (mean difference) (1)

Outcome	Augmented Community Telerehabilitation Intervention vs Usual care, Baseline, N2 = 45, N1 = 48	Augmented Community Telerehabilitation Intervention vs Usual care, 6 month, N2 = 38, N1 = 41	Augmented Community Telerehabilitation Intervention vs Usual care, 12 month, N2 = 35, N1 = 40
Person/participant generic health related quality of life (EQ5D VAS)	NA (NA to NA)	10.09 (0.53 to 19.65)	-10.09 (-19.86 to -1.67)

Outcome	Augmented Community Telerehabilitation Intervention vs Usual care, Baseline, N2 = 45, N1 = 48	Augmented Community Telerehabilitation Intervention vs Usual care, 6 month, N2 = 38, N1 = 41	Augmented Community Telerehabilitation Intervention vs Usual care, 12 month, N2 = 35, N1 = 40
Scale range: 0-100. Adjusted mean difference. Mean (95% CI)			

Person/participant generic health related quality of life (EQ5D VAS) - Polarity - Higher values are better

1.1.42.4.6. Continuous outcome (mean difference) (2)

Outcome	Augmented Community Telerehabilitation Intervention vs Usual care, Baseline, N2 = 47, N1 = 48	Augmented Community Telerehabilitation Intervention vs Usual care, 6 month, N2 = 38, N1 = 44	Augmented Community Telerehabilitation Intervention vs Usual care, 12 month, N2 = 35, N1 = 40
Stroke-specific Patient-Reported Outcome Measures (Stroke Impact Scale 3.0) Scale range: 0-100. Adjusted mean difference. Mean (95% CI)	NA (NA to NA)	2.68 (-5.35 to 10.7)	0.64 (-7.79 to 9.07)
Balance (step test) (Number of steps) Affected lower limb. Adjusted mean difference. Mean (95% CI)	NA (NA to NA)	0.06 (-0.11 to 0.23)	-0.047 (-0.25 to 0.16)

Stroke-specific Patient-Reported Outcome Measures (Stroke Impact Scale 3.0) - Polarity - Higher values are better
Balance (step test) - Polarity - Higher values are better

1.1.42.4.7. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.42.4.8. Dichotomousoutcomes-Withdrawalduetoadverseevents-NoOfEvents-Augmented Community Telerehabilitation Intervention-Usual care-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(due to missing outcome data)*
Overall bias and Directness	Overall Directness	Directly applicable

1.1.42.4.9. Dichotomousoutcomes-Withdrawalduetoadverseevents-NoOfEvents-Augmented Community Telerehabilitation Intervention-Usual care-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(due to missing outcome data)*
Overall bias and Directness	Overall Directness	Directly applicable

1.1.42.4.10. Continuousoutcome(meandifference)(1)-Person/participantgenerichealthrelatedqualityoflife(EQ5DVAS)-MeanNineFivePercentCI-Augmented Community Telerehabilitation Intervention-Usual care-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High *(due to missing data and bias in measurement of outcome)*
Overall bias and Directness	Overall Directness	Directly applicable

1.1.42.4.11. Continuousoutcome(meandifference)(1)-Person/participantgenerichealthrelatedqualityoflife(EQ5DVAS)-MeanNineFivePercentCI-Augmented Community Telerehabilitation Intervention-Usual care-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High *(due to missing data and bias in measurement of outcome)*
Overall bias and Directness	Overall Directness	Directly applicable

1.1.42.4.12. Continuousoutcome(meandifference)(2)-Stroke-specificPatient-ReportedOutcomeMeasures(StrokeImpactScale3.0)-MeanNineFivePercentCI-Augmented Community Telerehabilitation Intervention-Usual care-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High *(due to missing data and bias in measurement of outcome)*
Overall bias and Directness	Overall Directness	Directly applicable

1.1.42.4.13. Continuousoutcome(meandifference)(2)-Stroke-specificPatient-ReportedOutcomeMeasures(StrokeImpactScale3.0)-MeanNineFivePercentCI-Augmented Community Telerehabilitation Intervention-Usual care-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High *(due to missing data and bias in measurement of outcome)*
Overall bias and Directness	Overall Directness	Directly applicable

1.1.42.4.14. Continuousoutcome(meandifference)(2)-Balance(steptest)-MeanNineFivePercentCI-Augmented Community Telerehabilitation Intervention-Usual care-t6

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(due to missing outcome data)*
Overall bias and Directness	Overall Directness	Directly applicable

1.1.42.4.15. Continuousoutcome(meandifference)(2)-Balance(steptest)-MeanNineFivePercentCI-Augmented Community Telerehabilitation Intervention-Usual care-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(due to missing outcome data)*
Overall bias and Directness	Overall Directness	Directly applicable

1.1.43. Smith, 2012

Bibliographic Reference	Smith, Gregory C; Egbert, Nichole; Dellman-Jenkins, Mary; Nanna, Kevin; Palmieri, Patrick A; Reducing depression in stroke survivors and their informal caregivers: a randomized clinical trial of a Web-based intervention.; Rehabilitation psychology; 2012; vol. 57 (no. 3); 196-206

1.1.43.1. Study details

Secondary publication of another included	NR

study- see primary study for details	
Other publications associated with this study included in review	This paper was included in the Cochrane review that this review was based on: Laver KE, Adey-Wakeling Z, Crotty M, Lannin NA, George S, Sherrington C. Telerehabilitation services for stroke. Cochrane Database of Systematic Reviews 2020, Issue 1. Art. No.: CD010255. For further information about the data extraction please see the Cochrane review.
Trial name / registration number	NR
Study type	Randomised controlled trial (RCT)
Study location	USA
Study setting	community setting USA
Study dates	NR
Sources of funding	This research was funded by grant number R21NR010189-02 to Drs. Gregory C. Smith (PI); Nichole Egbert (CoPI; and Mary Dellman-Jenkins (Co-PI)
Inclusion criteria	Inclusion criteria: female caregiver providing care at home to husband after a stroke; either stroke survivor or caregiver scored 5 or greater on the PHQ-9 (at least mild depression), neither stroke survivor nor caregiver were medically unstable or terminally ill and both were cognitively able to participate
Exclusion criteria	Exclusion criteria: failure to meet above criteria
Recruitment / selection of participants	Dyads were recruited nationally through notices on Web sites and listserv announcements of key organizations (e.g., National Stroke Association; Family Caregiver Alliance).
Intervention(s)	Telerehabilitation intervention: consisted of 5 components designed to support the caregiver and provide caregiver with knowledge, resources and skills to assist him or her in reducing 'personal distress' and providing optimal emotional care to the stroke survivor. The 5 components included: 1. a professional guide to facilitate the intervention and provide email support; 2. educational videos; 3. online chat sessions; 4. email and message board; and 5. Resource Room (a virtual online library). Intervention took place over 11 weeks. Two online chat sessions weekly were led by the PG for a total of 17 sessions. Chats were held using Adobe Connect in groups of 4–5 CGs each.

Population subgroups	NR
Subgroup 1 - time after stroke	Unclear/not stated
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	Unclear/not stated
Subgroup 4 - Number of days of treatment per week	<5 days a week
Subgroup 5 - Focus of care	Mood
Subgroup 6 - Mode of delivery	Unclear None of these options. Web chat only
Subgroup 7 - Mode of feedback	Real time communication
Comparator	The control group received an online video in which the same Professional Guide explained the features of the Resource Room and encouraged CGs to use it as a caregiving resource. There was no further exposure to the Professional Guide beyond that video. A weekly caregiving tip was also presented online, but none overlapped with content covered in the intervention condition. A toll free phone number was provided in case CGs encountered technological problems while accessing the Resource Room, or if a medical emergency occurred. Halfway through the RCT, an assistant phoned CGs to see if they encountered technical difficulties in accessing the Resource Room.
Number of participants	38
Duration of follow-up	11 weeks

Indirectness	NR
Additional comments	NR

1.1.43.2. Study arms

1.1.43.2.1. Web-based psychoeducational intervention (N = 19)

Telerehabilitation intervention: consisted of 5 components designed to support the caregiver and provide caregiver with knowledge, resources and skills to assist him or her in reducing 'personal distress' and providing optimal emotional care to the stroke survivor. The 5 components included: 1. a professional guide to facilitate the intervention and provide email support; 2. educational videos; 3. online chat sessions; 4. email and message board; and 5. Resource Room (a virtual online library). Intervention took place over 11 weeks. Two online chat sessions weekly were led by the PG for a total of 17 sessions. Chats were held using Adobe Connect in groups of 4–5 CGs each.

1.1.43.2.2. Control group (N = 19)

The control group received an online video in which the same Professional Guide explained the features of the Resource Room and encouraged CGs to use it as a caregiving resource. There was no further exposure to the Professional Guide beyond that video. A weekly caregiving tip was also presented online, but none overlapped with content covered in the intervention condition. A toll free phone number was provided in case CGs encountered technological problems while accessing the Resource Room, or if a medical emergency occurred. Halfway through the RCT, an assistant phoned CGs to see if they encountered technical difficulties in accessing the Resource Room.

1.1.43.3. Characteristics

1.1.43.3.1. Study-level characteristics

Characteristic	Study (N = 38)
% Female Nominal	0
% Female Sample size	n = 0 ; % = 0
Ethnicity Mean (SD)	NR (NR)
Comorbidities Nominal	NR
Time period after stroke Nominal	NR
Severity Nominal	NR
Focus of care required Nominal	NR

1.1.43.3.2. Arm-level characteristics

Characteristic	Web-based psychoeducational intervention (N = 19)	Control group (N = 19)
Mean age (SD) Mean (SD)	59.9 (8.2)	59.1 (13.6)

1.1.43.4. Outcomes

1.1.43.4.1. Study timepoints

- Baseline
- 15 week

1.1.43.4.2. continuous outcomes

Outcome	Web-based psychoeducational intervention, Baseline, N = 19	Web-based psychoeducational intervention, 15 week, N = 15	Control group, Baseline, N = 19	Control group, 15 week, N = 17
Psychological distress - Depression (CES-D) Scale range: 0-60. Final values. Mean (SE)	21.3 (12.9)	14 (2.1)	19.3 (13.4)	17.9 (1.9)

Psychological distress - Depression (CES-D) - Polarity - Lower values are better

1.1.43.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.43.4.4. continuousoutcomes-Mood-depressionCESD-MeanSE-Web-based psychoeducational intervention-Control group-t15

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(due to bias in the measurement of the outcome)*
Overall bias and Directness	Overall Directness	Directly applicable

1.1.44. Uswatte, 2021

Bibliographic Reference	Uswatte, Gitendra; Taub, Edward; Lum, Peter; Brennan, David; Barman, Joydip; Bowman, Mary H; Taylor, Andrea; McKay, Staci; Sloman, Samantha B; Morris, David M; Mark, Victor W; Tele-rehabilitation of upper-extremity hemiparesis after stroke: Proof-of-concept randomized controlled trial of in-home Constraint-Induced Movement therapy.; Restorative neurology and neuroscience; 2021; vol. 39 (no. 4); 303-318

1.1.44.1. Study details

Secondary publication of another included study- see primary study for details	NR
Other publications associated with this study included in review	NR

Trial name / registration number	ClinicalTrials.gov (unique identifier: 01157195)
Study type	Randomised controlled trial (RCT)
Study location	USA
Study setting	Community setting
Study dates	NR
Sources of funding	Supported by the National Institute of Child Health and Human Development of the National Institutes of Health, Bethesda, MD under award number R01HD053750.
Inclusion criteria	To be enrolled, candidates had to be adults ≥ 1-year after stroke and display mild to-moderate motor impairment of the more-affected arm along with substantial nonuse of that arm. Three additional inclusion criteria were specific to this study. To permit the tele-rehabilitation workstation to be installed by project staff, all participants had to live in a neighborhood in which Hi-speed Internet was available and that was within a two-hour driving distance of the laboratory. In addition, participants had to have adequate vision and audition and technological knowhow to perform the training tasks on the workstation with coaching from project staff, if needed, after a brief instruction session.
Exclusion criteria	NR
Recruitment / selection of participants	Participants were recruited from individuals who contacted our laboratory in response to news reports about CIMT, as well as referrals from the inpatient consultation liason service and outpatient clinic of the physiatry department at our University medical cente.
Intervention(s)	Participants in the tele-health CIMT group, as noted, received the same type, amount, and intensity of training except that treatment was carried out in the home using Tele-AutoCITE with remote supervision provided by the trainer in the clinical research facility. A typical training session was similar to that for participants in the CIMT group except that training was done at home with Tele-AutoCITE and supervision was remote. The trainer made a phone call to the participant 30 minutes ahead of time to alert the participant to the upcoming session. The trainer selected the training tasks based on the individual needs of the participant and set the shaping parameters (e.g., distance to target) based on the participant's training records from previous sessions. Although the Tele-AutoCITE software automatically directed the participant, the trainer continuously monitored the progress of the participant using the audio-visual and data-stream feeds. She provided encouragement, answered questions, and altered the task and shaping parameter selections when needed.. The trainer completed the same Transfer Package elements as she did for participants in the CIMT group at the end of a session

	Concomitant therapy - Participants in both groups received 3.5 hours of treatment per day for 10 consecutive weekdays with one-on-one supervision from a trainer for the entirety of each treatment session. Three hours of each treatment session were committed to motor training following shaping principles; 30 minutes were committed to a package of procedures designed to promote changes in motor behavior outside the treatment setting During the period committed to motor training, participants were trained to perform upper extremity tasks exclusively with the more-affected arm in sets of ten 30 s trials with one minute rest intervals between trials and ten minute rest intervals between tasks. This schedule resulted in the completion of 7.5 tasks per session, with 37.5 minutes spent performing the tasks and 142.5 minutes spent resting. Participants in both groups were asked to place a physical restraint on the less-affected arm to discourage use of that arm both in and outside of the treatment sessions for a target of 90% of waking hours over the two-week treatment period. During the first month after treatment, participants received four telephone calls; they were part of the package of behavior change procedures. During these calls, which took place one week apart, trainers interviewed participants about use of their more-affected arm at home and guided problem-solving about any perceived or actual barriers to use of that arm.
Population subgroups	NR
Subgroup 1 - time after stroke	Chronic (>6 months)
Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	2-4 hours
Subgroup 4 - Number of days of treatment per week	7 days a week
Subgroup 5 - Focus of care	Upper limb

Subgroup 6 - Mode of delivery	Videoconferencing
Subgroup 7 - Mode of feedback	Real time communication
Comparator	Participants in the in-lab CIMT group received treatment face-to-face on an outpatient basis in our clinical research facility. In this group, training tasks were selected from a bank of 120 assembled by our laboratory based on the individual needs of a participant. Examples of tasks are lifting a stacking cones, spooning beans from a bowl to a plate, and picking up coins.
Number of participants	24
Duration of follow-up	1 year
Indirectness	NR
Additional comments	NR

1.1.44.2. Study arms

1.1.44.2.1. Telerehabililation CIMT (N = 12)

1.1.44.2.2. In-person CIMT (N = 12)

1.1.44.3. Characteristics

1.1.44.3.1. Study-level characteristics

Characteristic	Study (N = 24)
Comorbidities Nominal	NR
Severity Nominal	NR
Focus of care required Nominal	NR

1.1.44.3.2. Arm-level characteristics

Characteristic	Telerehabililation CIMT (N = 12)	In-person CIMT (N = 12)
% Female Sample size	n = 4 ; % = 33	n = 6 ; % = 50
Mean age (SD) Mean (95% CI)	63.8 (54.9 to 72.8)	55.3 (48.1 to 62.5)
Ethnicity Sample size	n = NR ; % = NR	n = NR ; % = NR
European-American Sample size	n = 7 ; % = 58	n = 8 ; % = 67

Characteristic	Telerehabililation CIMT (N = 12)	In-person CIMT (N = 12)
African american Sample size	n = 5 ; % = 42	n = 2 ; % = 17
Asian American Sample size	n = 0 ; % = 0	n = 2 ; % = 17

1.1.44.4. Outcomes

1.1.44.4.1. Study timepoints

- Baseline
- 10 day
- 1 year

Continuous outcomes

Outcome	Telerehabililation CIMT vs In-person CIMT, Baseline vs 10 day, N2 = 10, N1 = 10	Telerehabililation CIMT vs In-person CIMT, Baseline vs 1 year, N2 = 7, N1 = 7
Physical function – upper limb - MAL arm use 0-5 change scores Standardised Mean (95% CI)	0 (-0.8 to 0.7)	-0.1 (-1.3 to 1)

Physical function – upper limb - MAL arm use - Polarity - Higher values are better

1.1.44.4.2. Dichotomous outcomes

Outcome	Telerehabililation CIMT, Baseline, N = 12	Telerehabililation CIMT, 10 day, N = 12	Telerehabililation CIMT, 1 year, N = 12	In-person CIMT, Baseline, N = 12	In-person CIMT, 10 day, N = 12	In-person CIMT, 1 year, N = 12
Withdrawal due to adverse events No of events	n = 0 ; % = 0	n = 1 ; % = 8.3	n = 1 ; % = 8.3	n = 0 ; % = 0	n = 0 ; % = 0	n = 0 ; % = 0

Withdrawal due to adverse events - Polarity - Lower values are better

1.1.44.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.44.4.4. Dichotomousoutcomes-Withdrawalduetoadverseevents-NoOfEvents-Telerehabililation CIMT-In-person CIMT-t10

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.44.4.5. Dichotomousoutcomes-Withdrawalduetoadverseevents-NoOfEvents-Telerehabililation CIMT-In-person CIMT-t1

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable

1.1.44.4.6. Continuousoutcomes-Physicalfunction–upperlimb-MALarmuse-StandardisedMeanNineFivePercentCI-Telerehabililation CIMT-In-person CIMT-t10-vs-tBaseline

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.44.4.7. Continuousoutcomes-Physicalfunction–upperlimb-MALarmuse-StandardisedMeanNineFivePercentCI-Telerehabililation CIMT-In-person CIMT-t1-vs-tBaseline

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.45. Wu, 2020

Bibliographic Reference	Wu, Zhishui; Xu, Jingjuan; Yue, Chunxian; Li, Yi; Liang, Yongchun; Collaborative Care Model Based Telerehabilitation Exercise Training Program for Acute Stroke Patients in China: A Randomized Controlled Trial.; Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association; 2020; vol. 29 (no. 12); 105328

1.1.45.1. Study details

Secondary publication of another included study- see primary study for details	No additional information.
Other publications associated with this study included in review	No additional information.
Trial name / registration number	China Clinical Trial Center = ChiCTR1800018934
Study type	Randomised controlled trial (RCT)
Study location	China.
Study setting	Initially hospital based. Home based for the telerehabilitation group.
Study dates	December 2016 to December 2017.
Sources of funding	The study was funded by Changzhou Health Committee (guided project WZ201906).
Inclusion criteria	18-80 years old; diagnosis of ischaemic or haemorrhagic stroke, according to the Chinese Medical Association Neurology Branch in 2014; were confirmed by CT and/or MRI scans; neurological deficit degree score 5-15 points; limb dysfunction, Brunnstrom function stage II-III; choose home recuperation after discharge; ability of caregivers at least 40 points according to the caregiver capacity scale; get informed consent.
Exclusion criteria	Serious heart, liver, lung, kidney and other organ diseases; severe cognitive disabilities or mental disorder; other diseases that affect motor function, such as osteoarthrosis; complete aphasia; legal blindness or serious visual impairment.
Recruitment / selection of participants	Adults who were treated in the Department of Neurology in the Third Affiliated Hospital of Soochow University from December 2016 to December 2017.
Intervention(s)	Telerehabilitation (home remote rehabilitation) N=32

	Home remote rehabilitation based on a collaborative care model. The team consisted of neurologists, nurses, rehabilitation therapists, counselors and caregivers. Therapists assess the extent of dysfunction and work with family caregivers to develop rehabilitation plans and goals. The home remote rehabilitation guidance uses the Internet-based TCMeeting v6.0 video conferencing system. The system consists of a computer, a projector, a camera and a data storage system. The person installs the system on a computer at home, and the rehabilitation engineer and rehabilitation nurse perform a personalised remote rehabilitation instruction twice a week. Acutely the intervention includes health education, good limb positioning, breathing training, joint activity maintenance training, bed turning training, early balance training, early walking ability training and discharge guidance with an average of 2 sessions per day delivered in groups remotely. In the recovery period training included sitting-up training, balance training, antispasmodic training, intensive training of active activity ability of limbs, walking function training and activity training of daily life. Concomitant therapy: No additional information.
Population subgroups	No additional information.
Subgroup 1 - time after stroke	Unclear/not stated
Subgroup 2 - Severity	Moderate (or NIHSS 5-14)
Subgroup 3 - Minutes/hours of intervention per day	Unclear/not stated At least 32 minutes, but otherwise not particularly clear
Subgroup 4 - Number of days of treatment per week	5 days per week
Subgroup 5 - Focus of care	Lower limb
Subgroup 6 - Mode of delivery	Videoconferencing

Subgroup 7 - Mode of feedback	Real time communication
Comparator	Usual care N=32 During hospitalisation people received routine early rehabilitation guidance and routine nursing measures. The main contents were the normal limb position, bed position transfer and joint activity maintenance training. After discharge people in the control group received only routine rehabilitation and nursing measures, including dietary guidance, which were conducted by telephone follow-up once a week. People can go to the rehabilitation clinic to get rehabilitation instructions as needed. Concomitant therapy: No additional information.
Number of participants	64
Duration of follow-up	12 weeks (follow up at 4 weeks, 8 weeks and 12 weeks).
Indirectness	No additional information.
Additional comments	Method of analysis unclear. Appears to be completers only.

1.1.45.2. Study arms

1.1.45.2.1. Telerehabilitation (home remote rehabilitation) (N = 32)

Home remote rehabilitation based on a collaborative care model. The team consisted of neurologists, nurses, rehabilitation therapists, counselors and caregivers. Therapists assess the extent of dysfunction and work with family caregivers to develop rehabilitation plans and goals. The home remote rehabilitation guidance uses the Internet-based TCMeeting v6.0 video conferencing system. The system consists of a computer, a projector, a camera and a data storage system. The person installs the system on a computer at home, and the rehabilitation engineer and rehabilitation nurse perform a personalised remote rehabilitation instruction twice a week. Acutely the intervention includes health education, good limb positioning, breathing training, joint activity maintenance training, bed turning

training, early balance training, early walking ability training and discharge guidance with an average of 2 sessions per day delivered in groups remotely. In the recovery period training included sitting-up training, balance training, antispasmodic training, intensive training of active activity ability of limbs, walking function training and activity training of daily life. Concomitant therapy: No additional information.

1.1.45.2.2. Usual care (N = 32)

During hospitalisation people received routine early rehabilitation guidance and routine nursing measures. The main contents were the normal limb position, bed position transfer and joint activity maintenance training. After discharge people in the control group received only routine rehabilitation and nursing measures, including dietary guidance, which were conducted by telephone follow-up once a week. People can go to the rehabilitation clinic to get rehabilitation instructions as needed. Concomitant therapy: No additional information.

1.1.45.3. Characteristics

1.1.45.3.1. Arm-level characteristics

Characteristic	Telerehabilitation (home remote rehabilitation) (N = 32)	Usual care (N = 32)
% Female Sample size	n = 11 ; % = 36.7	n = 14 ; % = 45.2
Mean age (SD) (years) Mean (SD)	56.73 (11.85)	59.1 (8.6)
Ethnicity Sample size	n = NR ; % = NR	n = NR ; % = NR
Comorbidities Sample size	n = NR ; % = NR	n = NR ; % = NR

Characteristic	Telerehabilitation (home remote rehabilitation) (N = 32)	Usual care (N = 32)
Time period after stroke Mean (SD)	NR (NR)	NR (NR)
Severity NIHSS Mean (SD)	10.47 (2.66)	11.52 (3.76)
Focus of care required Sample size	n = NR ; % = NR	n = NR ; % = NR

1.1.45.4. Outcomes

1.1.45.4.1. Study timepoints

- Baseline
- 12 week (<6 months)

1.1.45.4.2. Continuous outcomes

Outcome	Telerehabilitation (home remote rehabilitation), Baseline, N = 30	Telerehabilitation (home remote rehabilitation), 12 week, N = 30	Usual care, Baseline, N = 31	Usual care, 12 week, N = 31
Activities of daily living (Modified Barthel Index) Scale range: 0-100. Final values. Mean (SD)	34.97 (4.04)	65.07 (4.15)	33.32 (4.25)	60.81 (5.24)

Outcome	Telerehabilitation (home remote rehabilitation), Baseline, N = 30	Telerehabilitation (home remote rehabilitation), 12 week, N = 30	Usual care, Baseline, N = 31	Usual care, 12 week, N = 31
Mobility (Timed Up and Go test) (seconds) Final values. Mean (SD)	41.93 (3.57)	19.5 (2.73)	40.58 (4.4)	23.97 (3.35)
Balance (Berg Balance Scale) Scale range: 0-56. Final values. Mean (SD)	21.07 (3.29)	43.13 (2.32)	20.87 (2.33)	38.29 (2.7)
Physical function - upper limb (Fugl Meyer Assessment Upper Extremity) Scale range: 0-66. Final values. Mean (SD)	11.93 (2.5)	55.33 (2.81)	12.61 (1.78)	47.42 (3.9)
Stroke-specific Patient-Reported Outcome Measures (Stroke Specific Quality of Life) Scale range: 49-245. Final values. Mean (SD)	114.33 (5.1)	190.57 (5.09)	115 (3.57)	175.9 (5.78)

Activities of daily living (Modified Barthel Index) - Polarity - Higher values are better
Mobility (Timed Up and Go test) - Polarity - Lower values are better
Balance (Berg Balance Scale) - Polarity - Higher values are better
Physical function - upper limb (Fugl Meyer Assessment Upper Extremity) - Polarity - Higher values are better
Stroke-specific Patient-Reported Outcome Measures (Stroke Specific Quality of Life) - Polarity - Higher values are better

1.1.45.4.3. Dichotomous outcome

Outcome	Telerehabilitation (home remote rehabilitation), Baseline, N = 32	Telerehabilitation (home remote rehabilitation), 12 week, N = 32	Usual care, Baseline, N = 32	Usual care, 12 week, N = 32
Withdrawal due to adverse events Intervention: Withdrawal due to serious illness = 1, death = 1. Control: = 0. No of events	n = NA ; % = NA	n = 2 ; % = 6.7	n = NA ; % = NA	n = 0 ; % = 0

Withdrawal due to adverse events - Polarity - Lower values are better

1.1.45.4.4. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.45.4.5. Continuousoutcomes-Activitiesofdailyliving(ModifiedBarthelIndex)-MeanSD-Telerehabilitation (home remote rehabilitation)-Usual care-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.45.4.6. Continuousoutcomes-Mobility(TimedUpandGotest)-MeanSD-Telerehabilitation (home remote rehabilitation)-Usual care-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.45.4.7. Continuousoutcomes-Balance(BergBalanceScale)-MeanSD-Telerehabilitation (home remote rehabilitation)-Usual care-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.45.4.8. Continuousoutcomes-Physicalfunction-upperlimb(FuglMeyerAssessmentUpperExtremity)-MeanSD-Telerehabilitation (home remote rehabilitation)-Usual care-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.45.4.9. Continuousoutcomes-Stroke-specificPatient-ReportedOutcomeMeasures(StrokeSpecificQualityofLife)-MeanSD-Telerehabilitation (home remote rehabilitation)-Usual care-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.45.4.10. Dichotomousoutcome-Withdrawalduetoadverseevents-NoOfEvents-Telerehabilitation (home remote rehabilitation)-Usual care-t12

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

1.1.46. Zhou, 2018

Bibliographic Reference	Zhou Q; Lu X; Zhang Y; Sun Z; Li J; Zhu Z; Telerehabilitation Combined Speech-Language and Cognitive Training Effectively Promoted Recovery in Aphasia Patients.; Frontiers in psychology; 2018; vol. 9

1.1.46.1. Study details

Secondary publication of another included study- see primary study for details	NR

Other publications associated with this study included in review	NR
Trial name / registration number	NR
Study type	Randomised controlled trial (RCT)
Study location	China
Study setting	Jiangsu Provincial People's Hospital rehabilitation medicine center and home based
Study dates	NR
Sources of funding	This work was supported by grants from the Natural Science Foundation of China (NSFC 31571156, 31871133) and grants from Jiangsu Province (BRA2017392, 2017-JY-025, H201670 and KYLX16_1302).
Inclusion criteria	Inclusion criteria were that there was no abnormality in language function before onset; patients were diagnosed with cerebral infarction or cerebral hemorrhage, and the lesions were stable; and the patients were able to perform training tasks, with no obvious memory impairment or intelligence impairment.
Exclusion criteria	Exclusion criteria were that patients had exacerbation, new infarctions or bleeding lesions, hearing impairments, visual disturbance, severe mental illness, or intellectual disturbance; could not tolerate the assessment tasks or treatment; or had epilepsy or disturbance of consciousness.
Recruitment / selection of participants	NR
Intervention(s)	Computerized intervention for aphasia that combined speech-language and cognitive training - DTG group engaged in family topics communication for 30 min a day, with additional computerized speech-language and cognitive training, delivered via telerehabilitation, for 30 min a day for 30 consecutive days.
Population subgroups	NR
Subgroup 1 - time after stroke	Subacute (7 days - 6 months)

Subgroup 2 - Severity	Unclear/not stated
Subgroup 3 - Minutes/hours of intervention per day	≤45 minutes
Subgroup 4 - Number of days of treatment per week	7 days a week
Subgroup 5 - Focus of care	Cognition Communication
Subgroup 6 - Mode of delivery	Unclear
Subgroup 7 - Mode of feedback	Real time communication
Comparator	Usual care - The DCG group engaged in family topics communication for 30 min a session, 2 times a day for 30 days.
Number of participants	20
Duration of follow-up	Presumed 1 month (end of intervention).
Indirectness	NR
Additional comments	NR

1.1.46.2. Study arms

1.1.46.2.1. Computerized intervention for aphasia that combined speech-language and cognitive training (N = 10)

Intervention group engaged in family topics communication for 30 min a day, with additional computerized speech-language and cognitive training, delivered via telerehabilitation, for 30 min a day for 30 consecutive days. Telerehabilitation training program adopted from the Wispirit Inc. The program included both a speech-language module and a cognitive training module. The speech-language module included tasks on auditory comprehension, reading comprehension, repetition, naming and writing. The cognitive module included tasks about attention, memory and executive function. On each training day, the person completed five cognitive rehabilitation games (2 minutes per day) and four speech rehabilitation games (5 minutes per day). Training was 30 minutes a session, 2 times a day for 30 days. Concomitant therapy: No additional information.

1.1.46.2.2. Usual care (N = 10)

The control group engaged in family topics communication for 30 min a session, 2 times a day for 30 days. Concomitant therapy: No additional information.

1.1.46.3. Characteristics

1.1.46.3.1. Study-level characteristics

Characteristic	**Study (N = 20)**
Ethnicity Nominal	NR
Comorbidities Nominal	NR
Severity Nominal	NR

Characteristic	Study (N = 20)
Focus of care required Nominal	NR

1.1.46.3.2. Arm-level characteristics

Characteristic	Computerized intervention for aphasia that combined speech-language and cognitive training (N = 10)	Usual care (N = 10)
% Female Sample size	n = 3 ; % = 30	n = 4 ; % = 40
Mean age (SD) Mean (SD)	59.8 (11.26)	56.5 (14.34)
Time period after stroke days Mean (SD)	31 (17.06)	32.8 (19.89)

1.1.46.4. Outcomes

1.1.46.4.1. Study timepoints

- Baseline
- 1 month

1.1.46.4.2. Continuous outcomes

Outcome	Computerized intervention for aphasia that combined speech-language and cognitive training, Baseline, N = 10	Computerized intervention for aphasia that combined speech-language and cognitive training, 1 month, N = 10	Usual care , Baseline, N = 10	Usual care , 1 month, N = 10
Communication - Functional communication (Communication activities of daily living) Scale range unclear. Final values. Mean (SD)	20.4 (27.7)	33.8 (23.4)	25.3 (27.7)	31 (28.8)
Communication - Overall language ability (Aphasic quotient) Scale range: 0-100. Final values. Mean (SD)	35.6 (25.5)	55.3 (23.2)	43 (30.7)	50.1 (28.8)

Communication - Functional communication (Communication activities of daily living) - Polarity - Higher values are better
Communication - Overall language ability (Aphasic quotient) - Polarity - Higher values are better

1.1.46.4.3. Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Normal RCT

1.1.46.4.4. Continuousoutcomes-Communication-Overalllanguageability(Aphasicquotient)-MeanSD-Computerized intervention for aphasia that combined speech-language and cognitive training-Usual care -t1

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable

1.1.46.4.5. Continuousoutcomes-Communication-Functionalcommunication(Communicationactivitiesofdailyliving)-MeanSD-Computerized intervention for aphasia that combined speech-language and cognitive training-Usual care - t1

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	High
Overall bias and Directness	Overall Directness	Directly applicable

Appendix E Forest plots

E.1 Telerehabilitation compared to in person rehabilitation and usual care

E.1.1 Telerehabilitation compared to in person rehabilitation

Figure 2: Person/participant generic health-related quality of life (EuroQol-5D, 0-100, higher values are better, final value) at ≥6 months

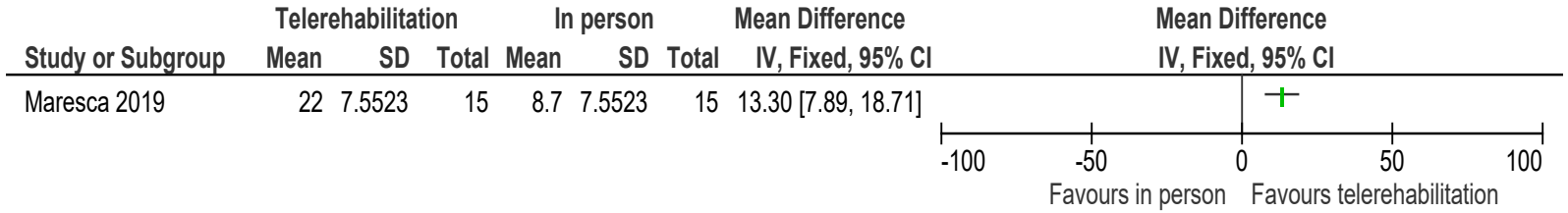


Figure 3: Activities of daily living (Barthel index, 0-100, higher values are better, change scores and final value) at <6 months

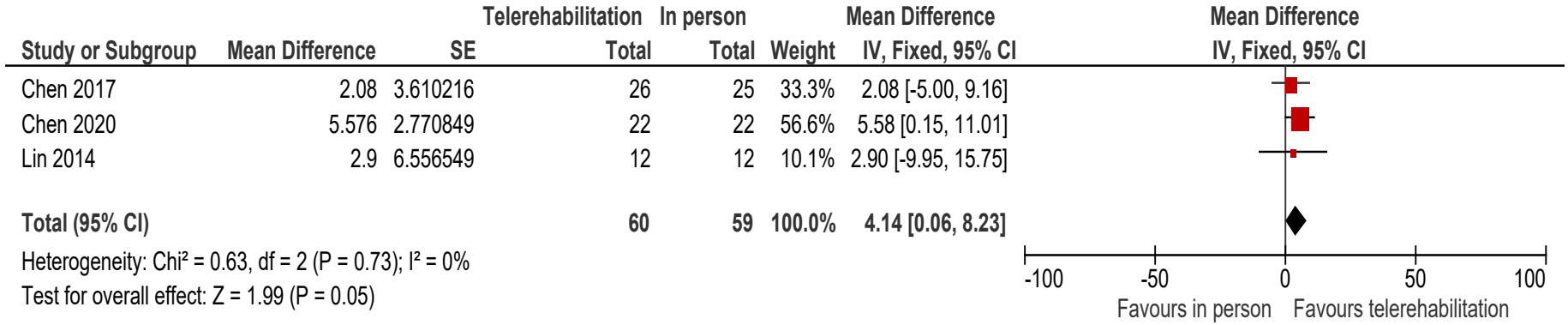


Figure 4: Activities of daily living (Barthel index, 0-100, higher values are better, change score) at ≥6 months

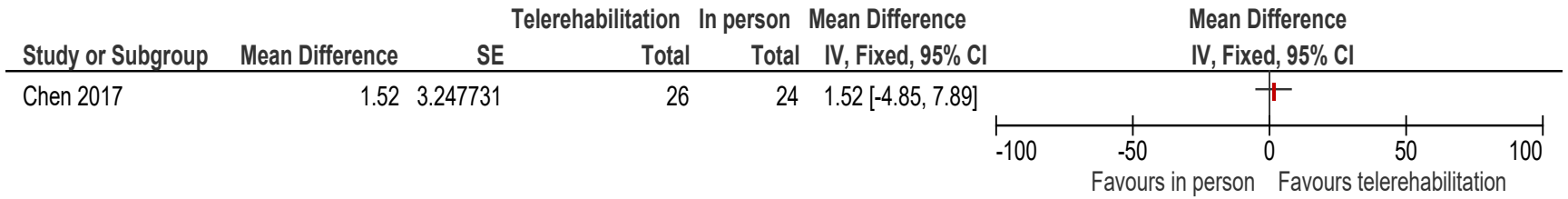


Figure 5: Balance (Berg balance scale, 0-56, higher values are better, change score and final value) at <6 months

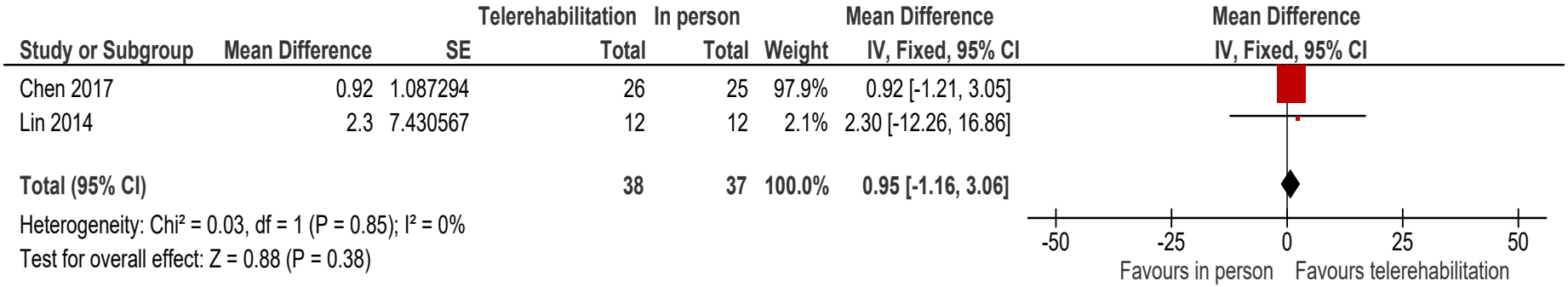


Figure 6: Balance (Berg balance scale, 0-56, higher values are better, change score) at ≥6 months

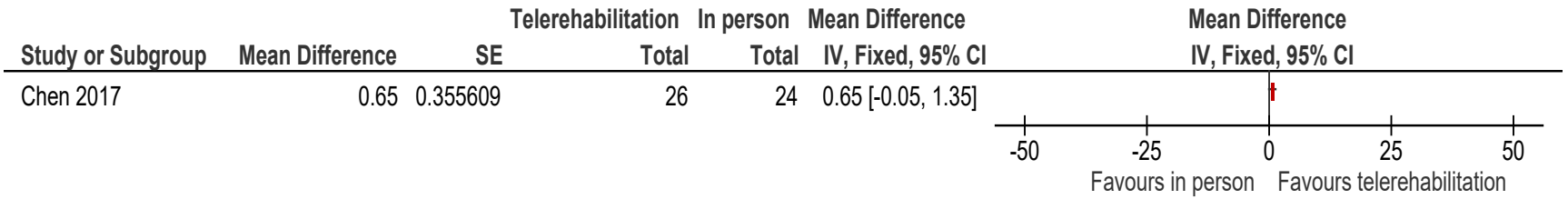


Figure 7: Psychological distress - depression (Aphasic depression rating scale, 0-32, lower values are better, change score) at ≥6 months

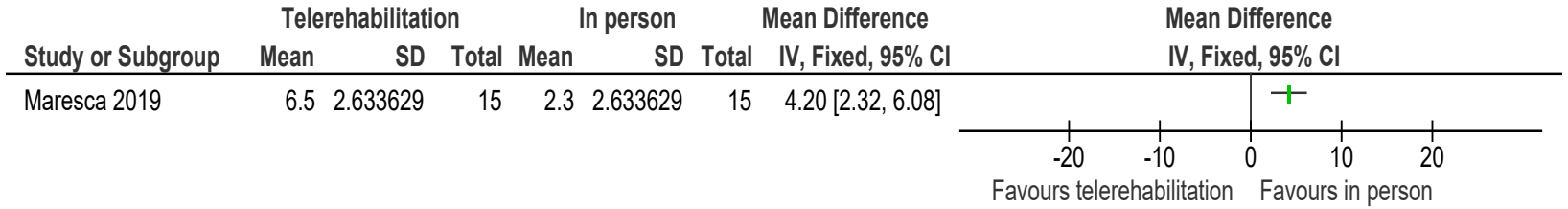


Figure 8: Physical function - upper limb (Fugl-Meyer Assessment Upper Extremity, 0-66, higher values are better, change scores and final values) at <6 months

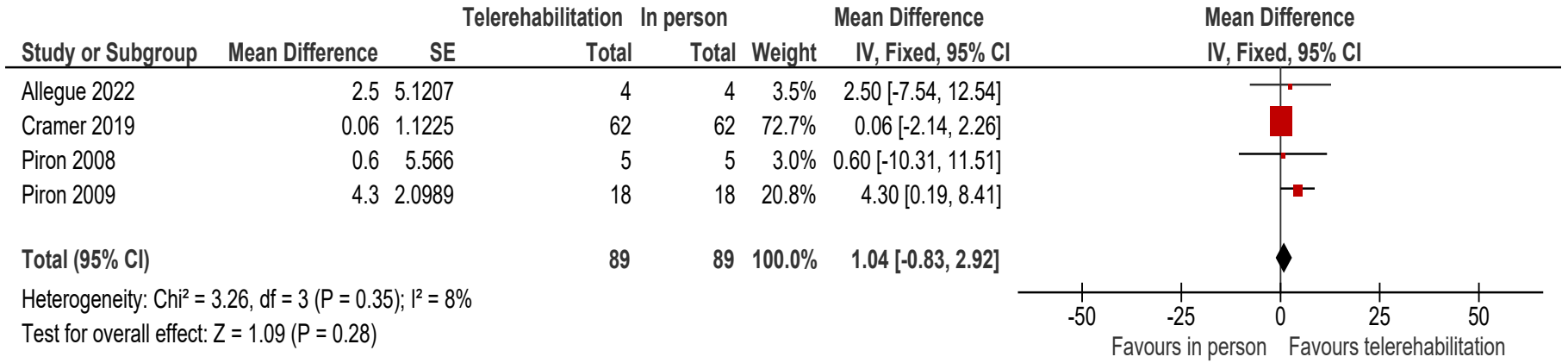


Figure 9: Physical function upper limb (Fugl Meyer Assessment, 0-100, higher values are better, change score) at <6 months

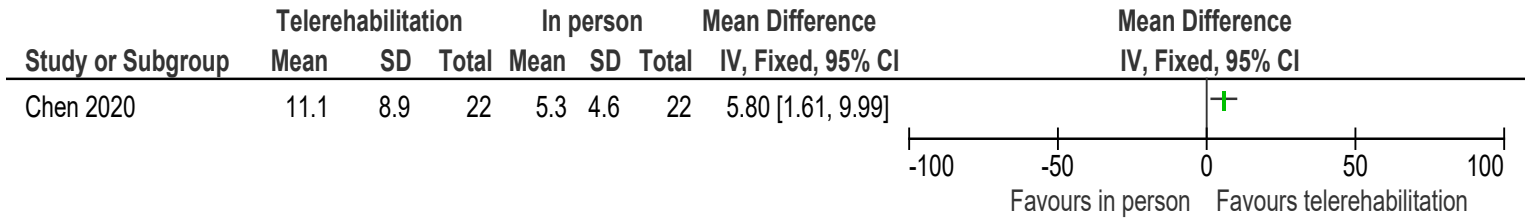


Figure 10: Physical function - upper limb (motor assessment log arm use, 0-5, higher values are better, change score) at <6 months

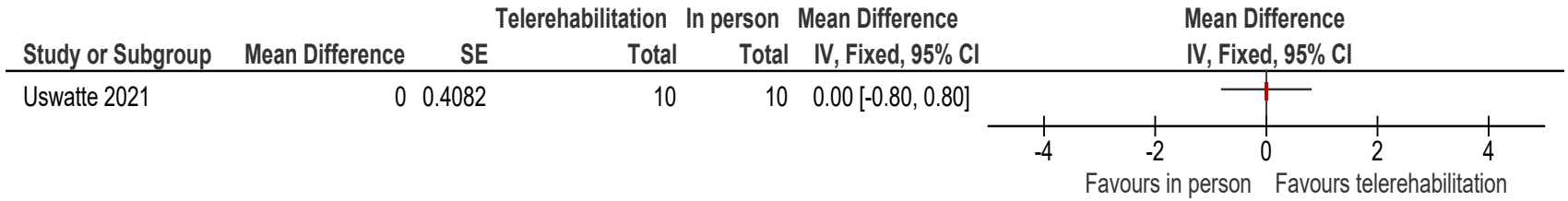


Figure 11: Physical function - upper limb (motor assessment log arm use, 0-5, higher values are better, change score) at ≥6 months

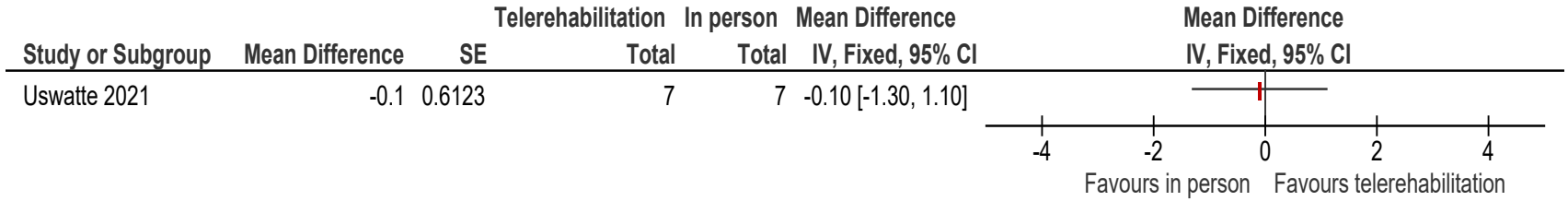


Figure 12: Stroke-specific measures of cognition - non-spatial attention and working memory (Cognitive linguistic quick test - attention, 0-215, higher values are better, change score) at <6 months

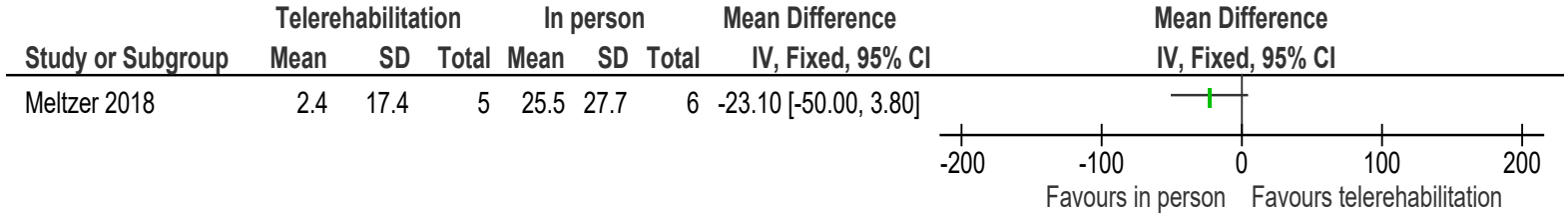


Figure 13: Stroke-specific measures of cognition - memory (Cognitive linguistic quick test - memory, 0-185, higher values are better, change score) at <6 months

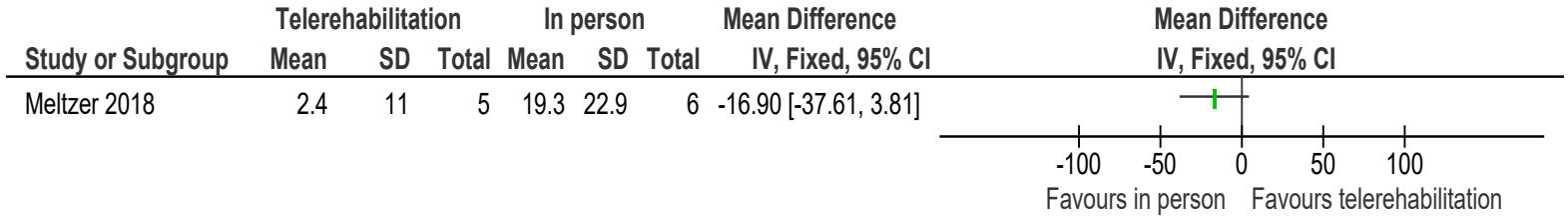


Figure 14: Stroke-specific measures of cognition - executive functions (Cognitive linguistic quick test - executive function, 0-40, higher values are better, change score) at <6 months

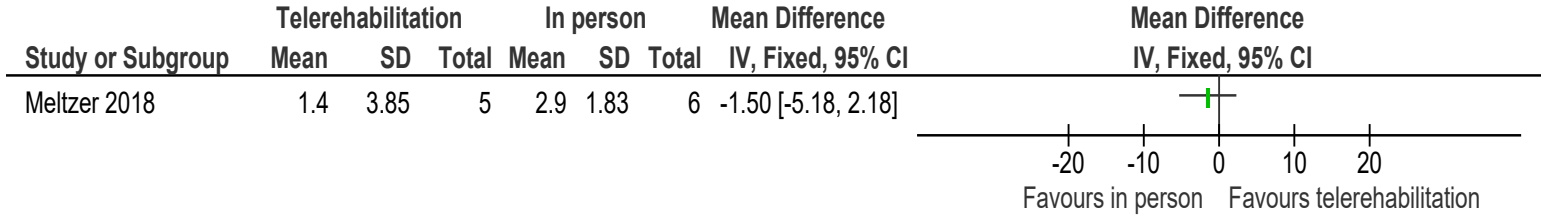


Figure 15: Stroke-specific Patient-Reported Outcome Measures (Stroke impact scale hand function, 0-100, higher values are better, change score) at <6 months

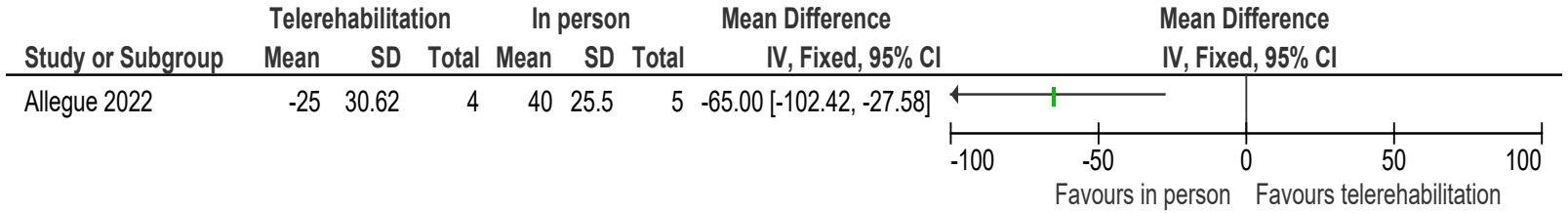


Figure 16: Stroke-specific Patient-Reported Outcome Measures (Stroke impact scale activities of daily living, 0-100, higher values are better, change score) at <6 months

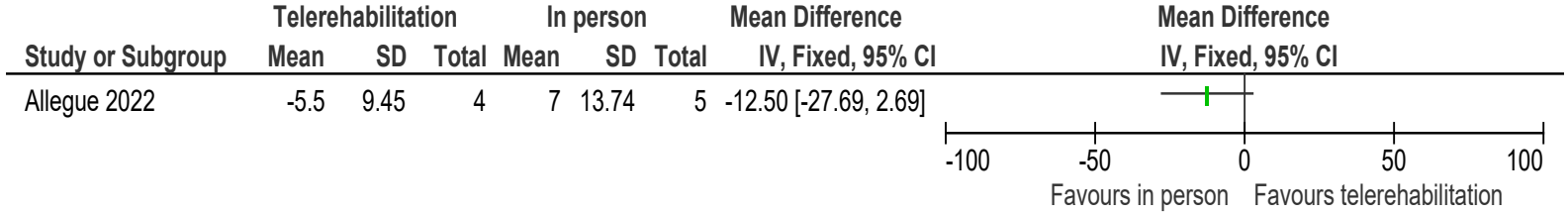


Figure 17: Stroke-specific Patient-Reported Outcome Measures (Stroke impact scale mobility, 0-100, higher values are better, change score) at <6 months

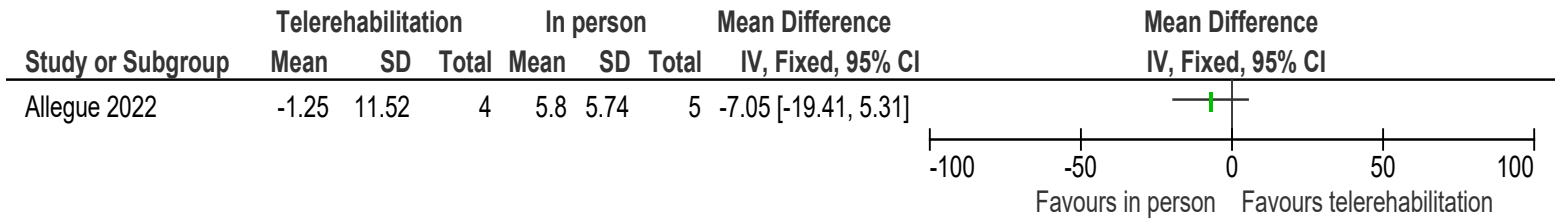


Figure 18: Withdrawal due to adverse events at <6 months

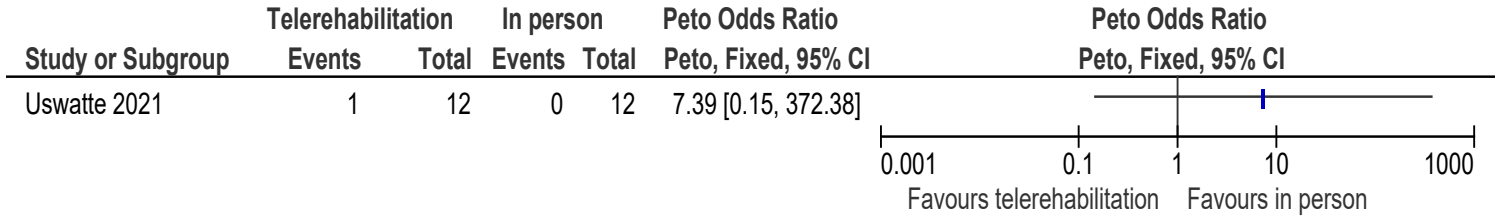
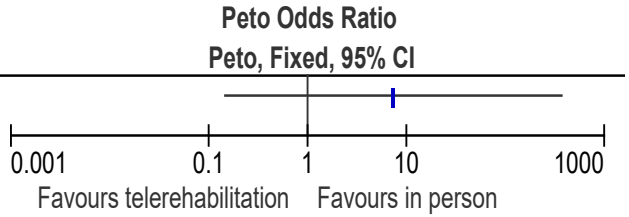


Figure 19: Withdrawal due to adverse events at ≥6 months

Study or Subgroup	Telerehabilitation Events	Total	In person Events	Total	Peto Odds Ratio Peto, Fixed, 95% CI
Uswatte 2021	1	12	0	12	7.39 [0.15, 372.38]



E.1.2 Telerehabilitation compared to usual care

Figure 20: Activities of daily living (Barthel index, 0-100, higher values are better, final value) at <6 months

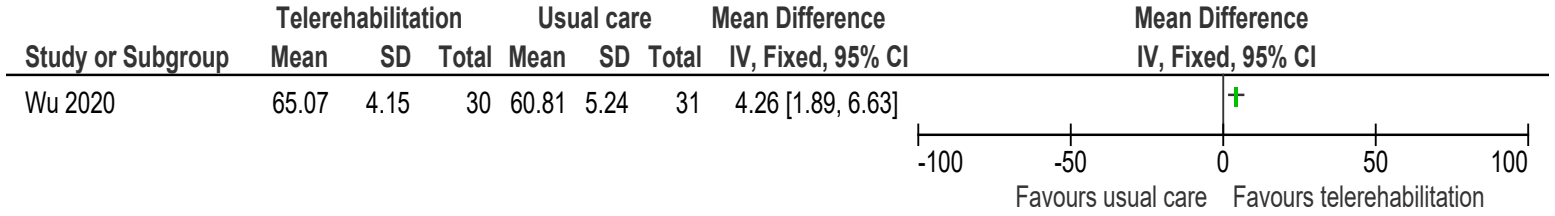


Figure 21: Activities of daily living (Canadian Occupational Performance Measure performance untrained, 1-10, higher values are better, final value) at <6 months

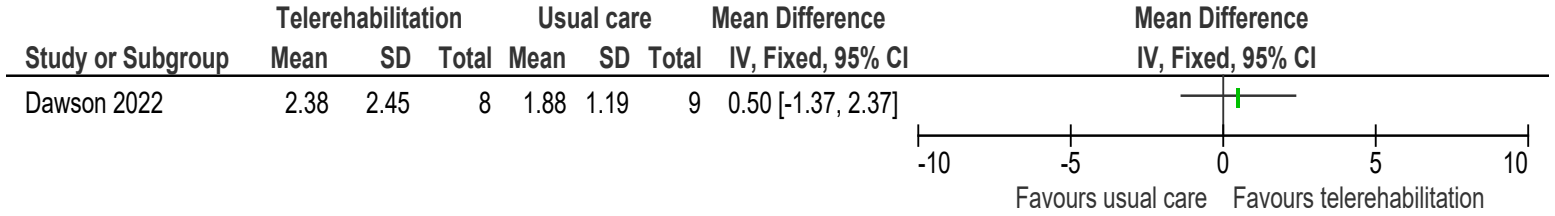


Figure 22: Activities of daily living (Canadian Occupational Performance Measure satisfaction untrained, 1-10, higher values are better, final value) at <6 months

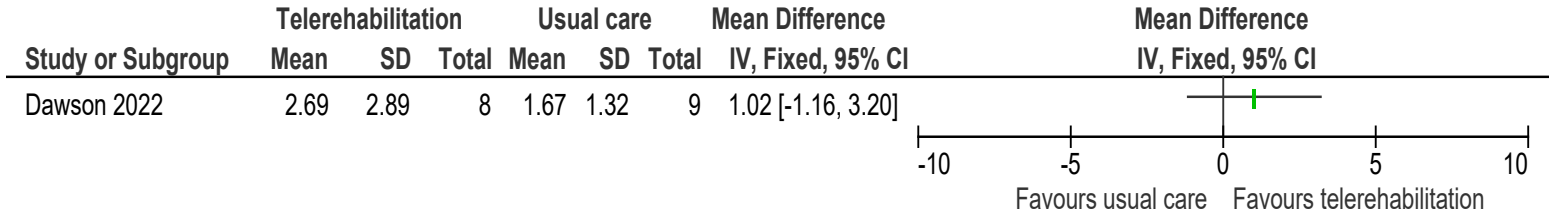


Figure 23: Activities of daily living (Barthel index, 0-100, higher values are better, final value) at ≥6 months

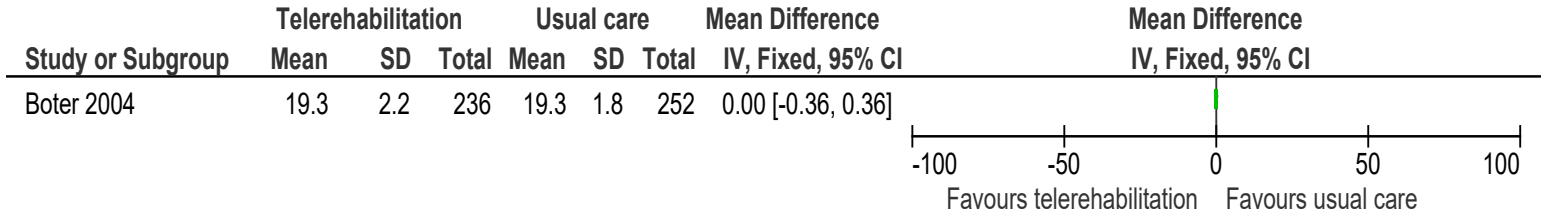


Figure 24: Mobility (timed up and go [seconds], lower values are better, final value) at <6 months

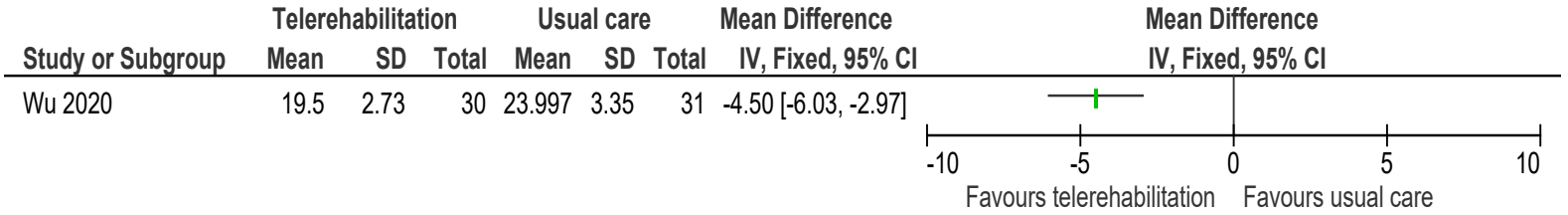


Figure 25: Mobility (walking speed [meters/second], higher values are better, final value) at <6 months

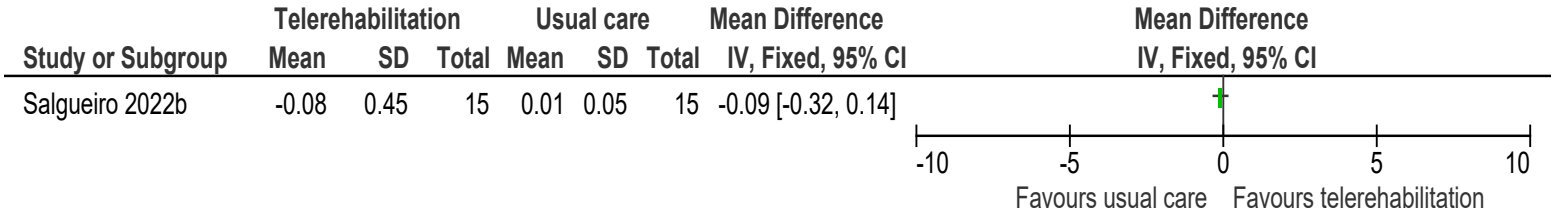


Figure 26: Mobility (spanish version trunk impairment scale, 0-16, higher values are better, final value) at <6 months

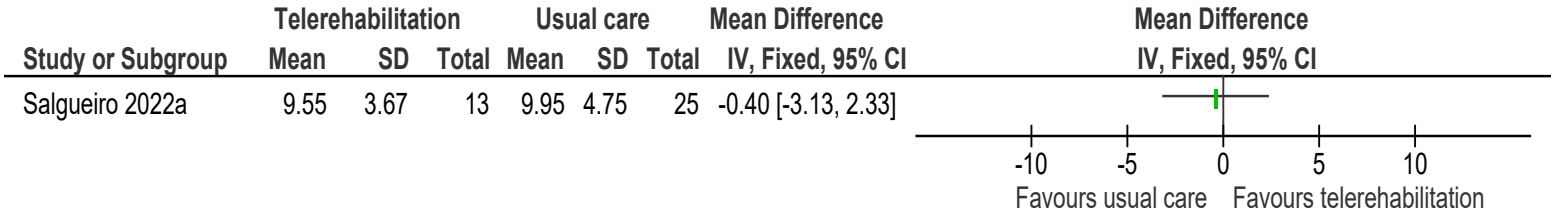


Figure 27: Balance (Berg balance scale, 0-56, higher values are better, change score and final values) at <6 months

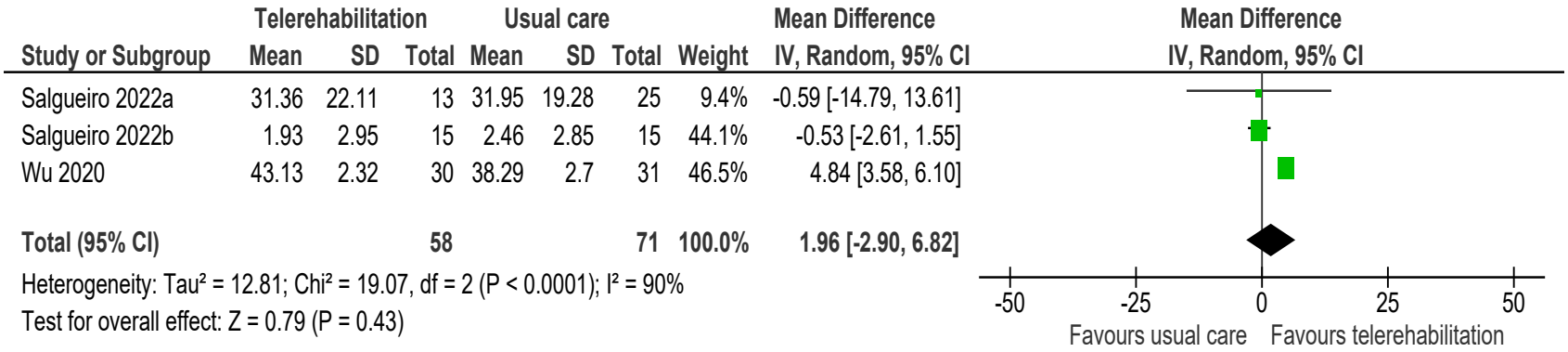


Figure 28: Psychological distress - depression (PHQ-9, 0-27, lower values are better, change score) at <6 months

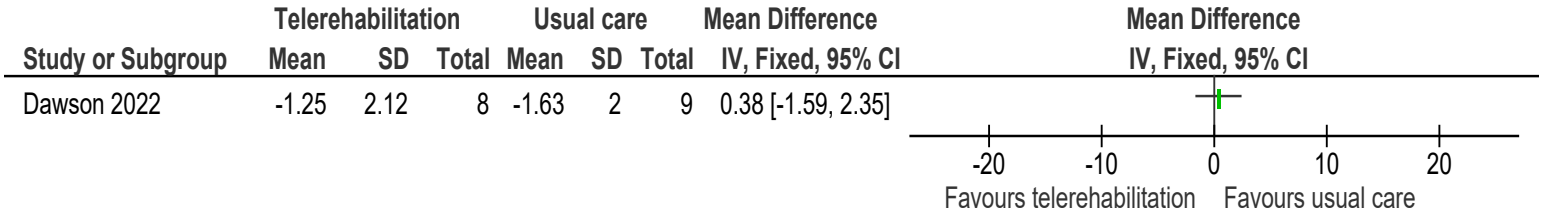


Figure 29: Psychological distress - depression (Center for Epidemiological Studies Depression scale, 0-60, lower values are better, final value) at <6 months

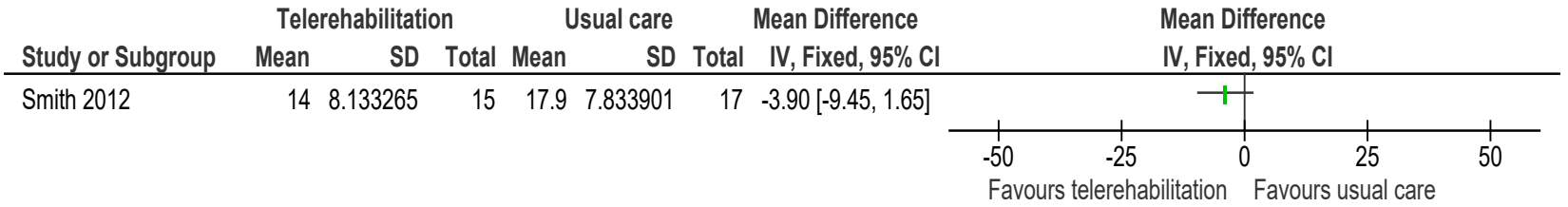


Figure 30: Psychological distress - depression (Hospital Anxiety and Depression subscale, 0-100, lower values are better, final value) at ≥6 months

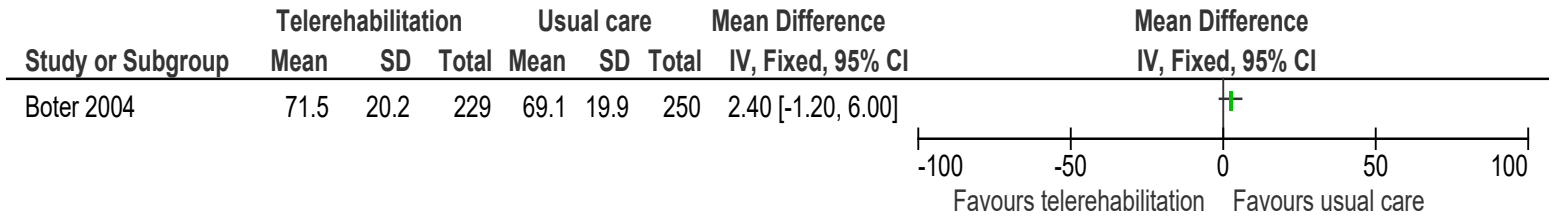


Figure 31: Physical function - upper limb (Fugl Meyer Assessment Upper Extremity, Late Life Function and Disability Instrument [different scale ranges], higher values are better, final values) at <6 months

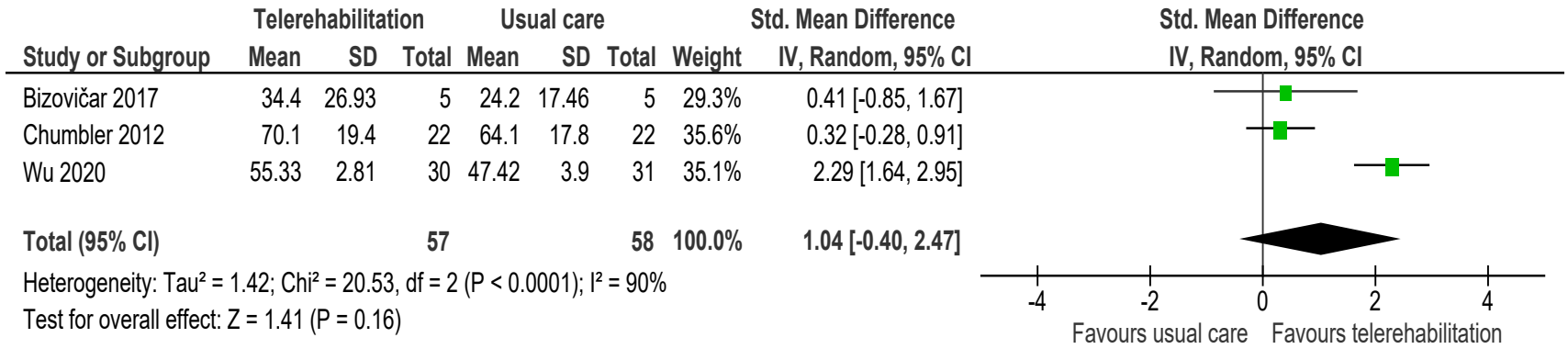


Figure 32: Physical function - upper limb (Late Life Function and Disability Instrument, 0-100, higher values are better, final value) at ≥6 months

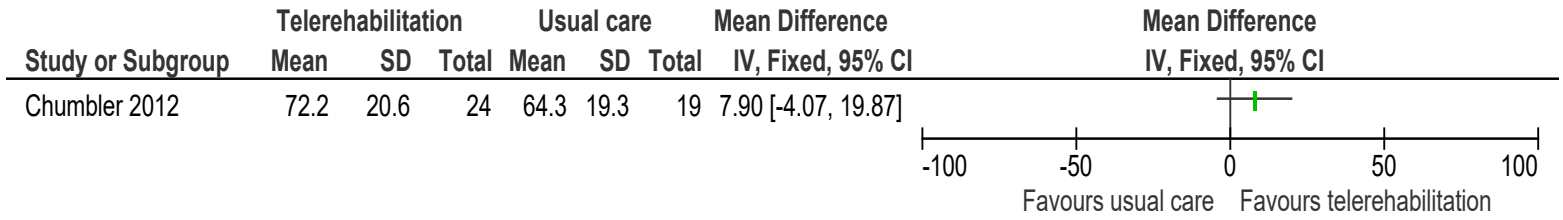


Figure 33: Stroke-specific Patient-Reported Outcome Measures (Stroke specific Quality of Life, 49-245, higher values are better, final value) at <6 months

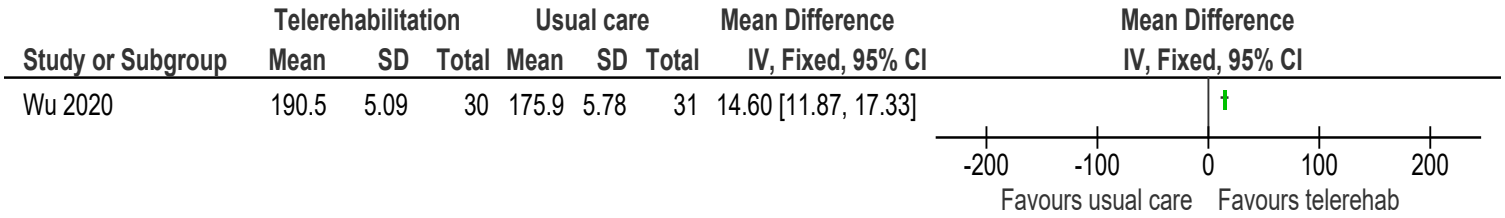
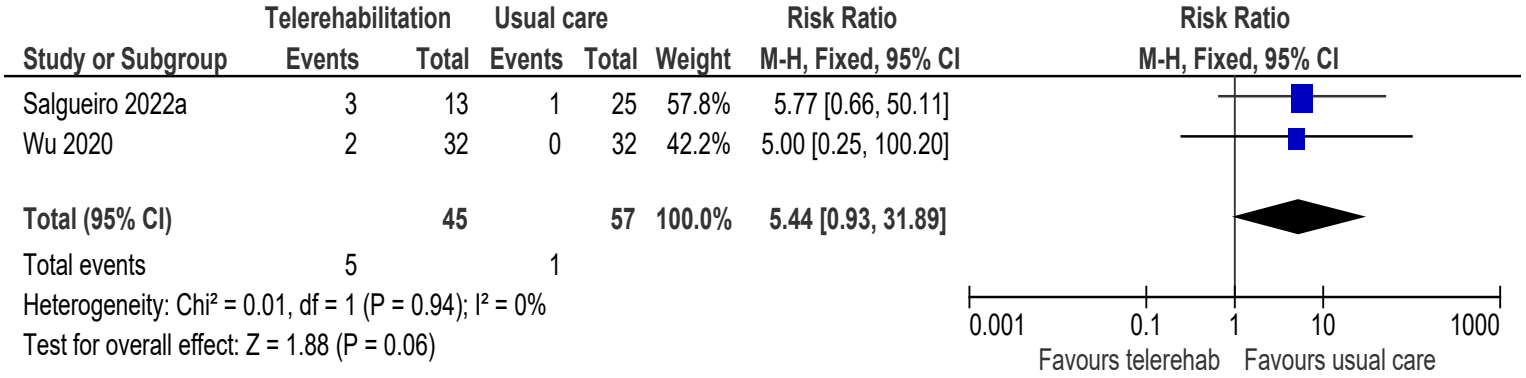


Figure 34: Withdrawal due to adverse events at <6 months



E.2 Combination of telerehabilitation and in person rehabilitation compared to in person rehabilitation and usual care

E.2.1 Combination of telerehabilitation and in person rehabilitation compared to in person rehabilitation

Figure 35: Person/participant generic health-related quality of life (EQ-5D, -0.11-1, higher values are better, final value) at <6 months

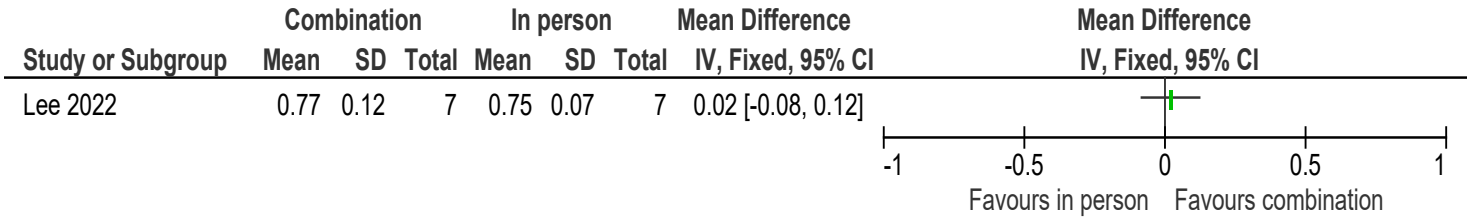


Figure 36: Activities of daily living (Barthel index, 0-100, higher values are better, final value) at <6 months

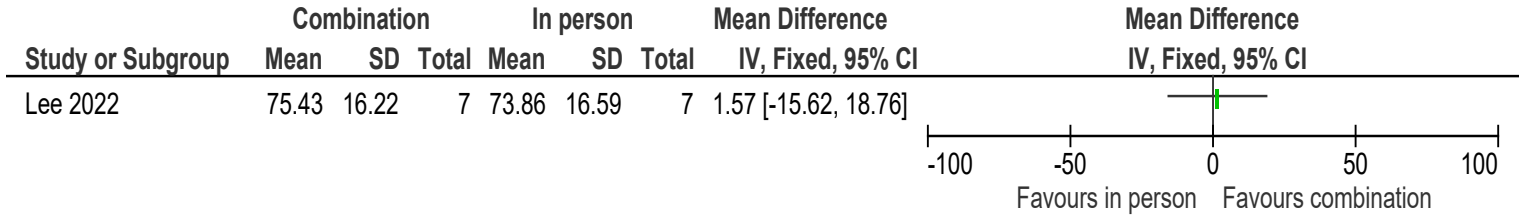


Figure 37: Mobility (timed up and go [secs], lower values are better, final value) at <6 months

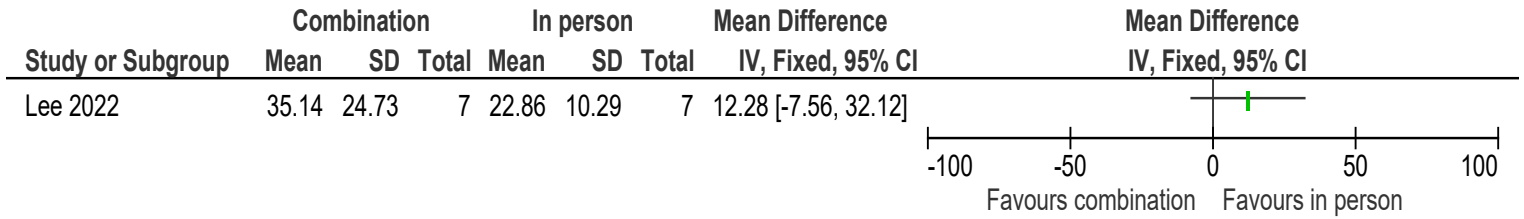


Figure 38: Balance (Berg balance scale, 0-56, higher values are better, final values) at <6 months

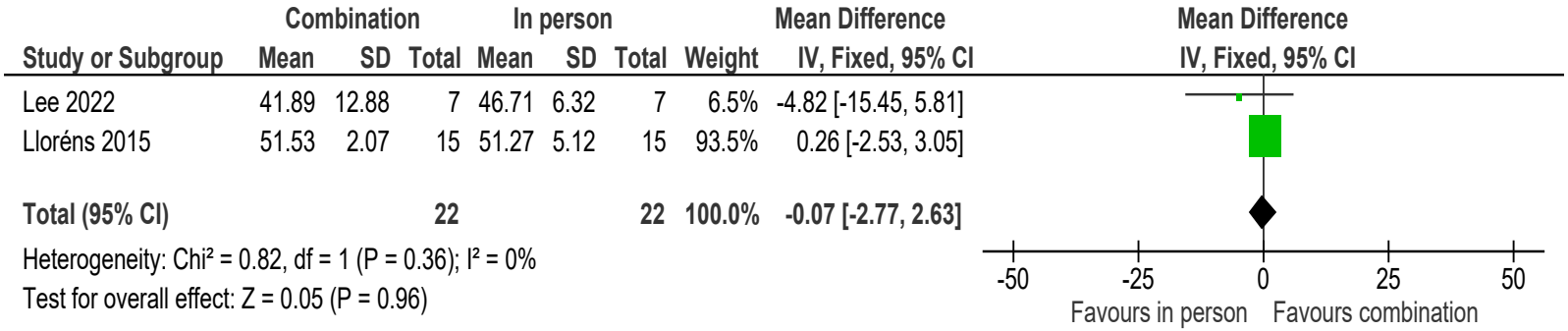


Figure 39: Psychological distress - depression (Hamiliton depression rating scale, 0-56, lower values are better, final value) at <6 months

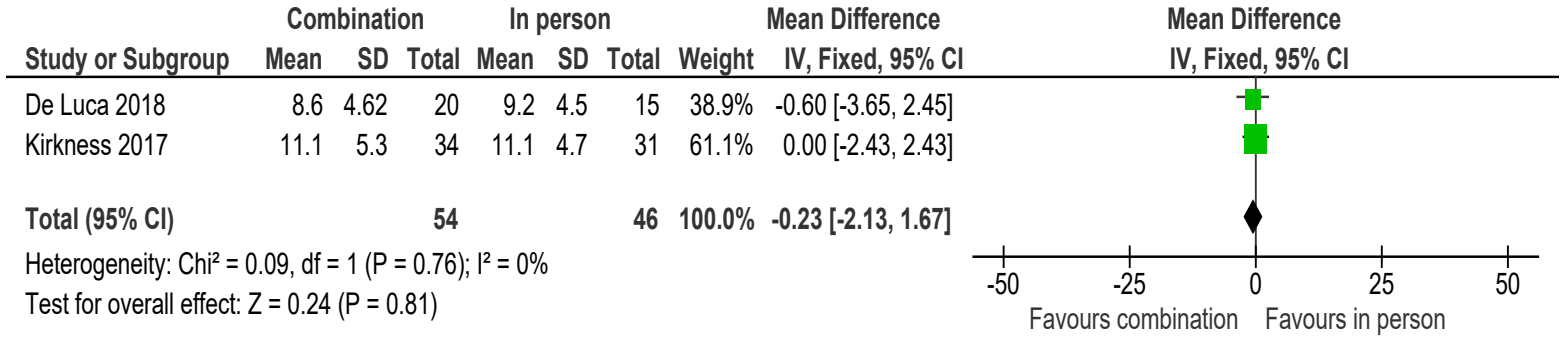


Figure 40: Stroke-specific measures of cognition – non-spatial attention and working memory (attentive matrices, scale range unclear, higher values are better, final value) at <6 months

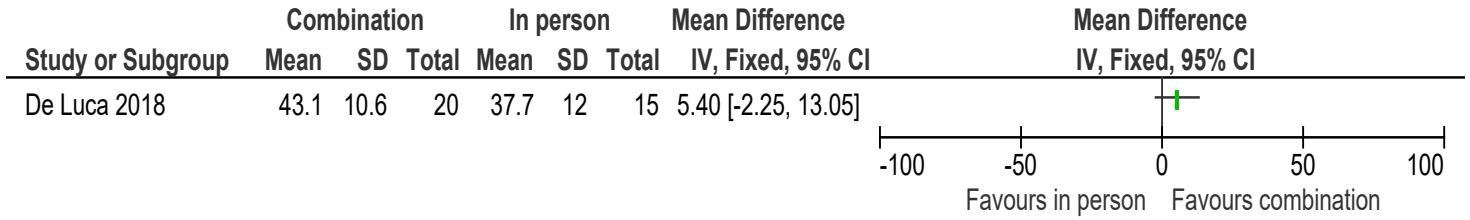


Figure 41: Stroke-specific measures of cognition – non-spatial attention and working memory (digital span, scale range unclear, higher values are better, final value) at <6 months

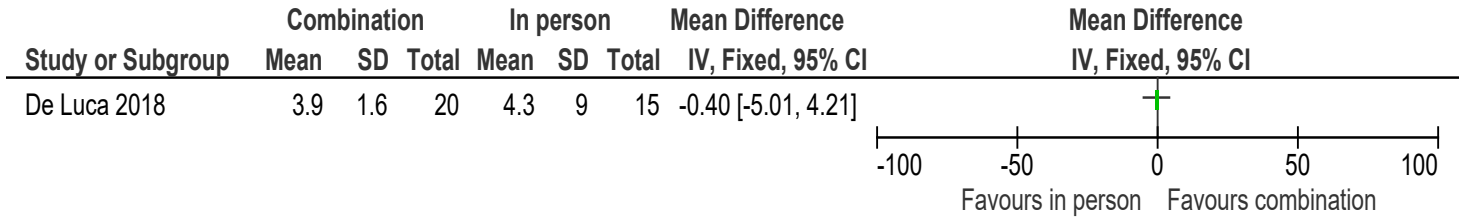
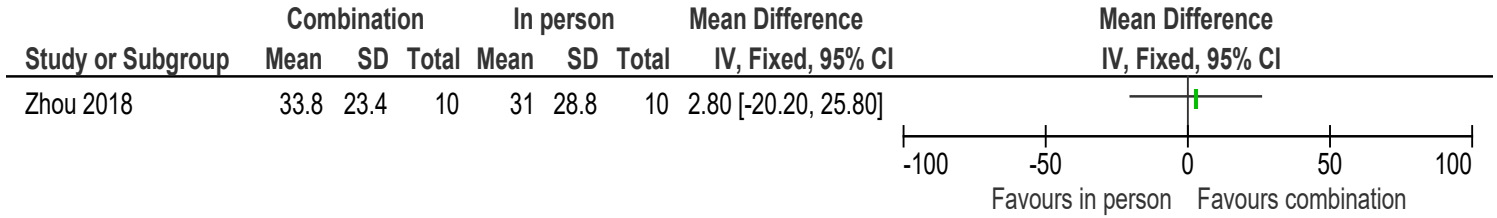


Figure 42: Functional communication (communication activities of daily living, scale range unclear, higher values are better, final value) at <6 months



E.2.2 Combination of telerehabilitation and in person rehabilitation compared to usual care

Figure 43: Person/participant generic health-related quality of life (EQ-5D, -0.11-1, higher values are better, change score) at <6 months

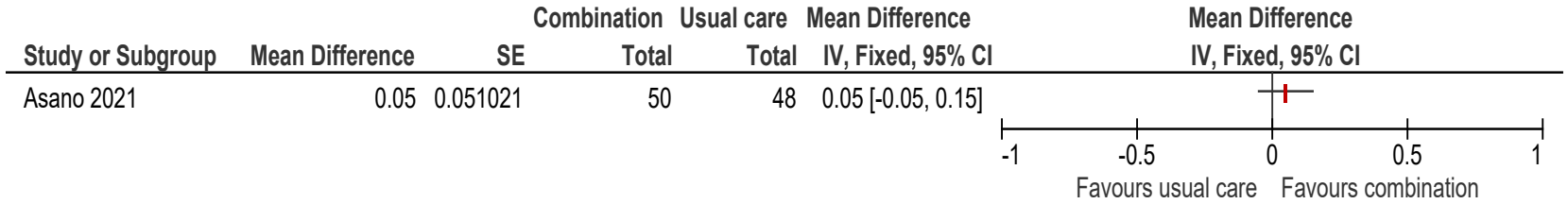


Figure 44: Person/participant generic health-related quality of life (EQ-5D-5L, scale range unclear, lower values are better, change score) at <6 months

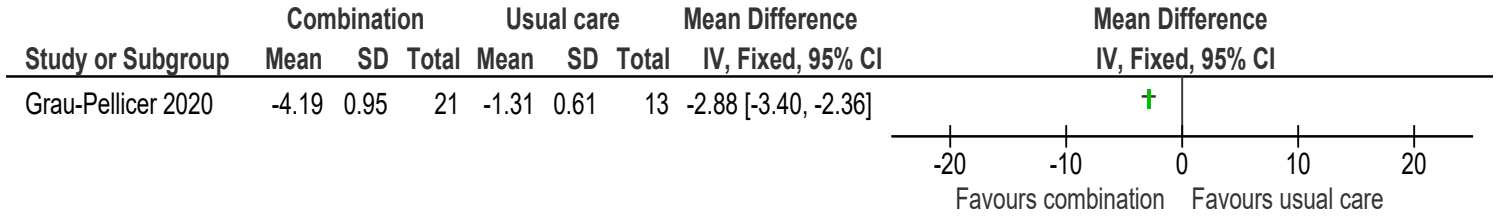


Figure 45: Person/participant generic health-related quality of life (EQ-5D VAS, 0-100, higher values are better, change scores) at ≥6 months

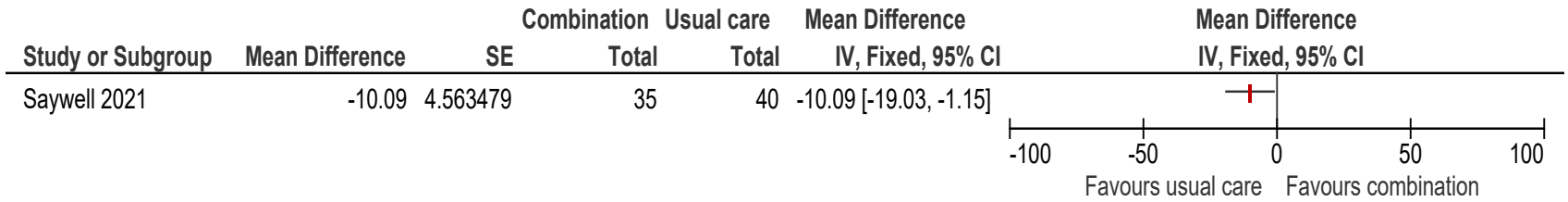


Figure 46: Activities of daily living (Barthel Index, Functional Independence Measure [different scale ranges], higher values are better, change scores) at <6 months

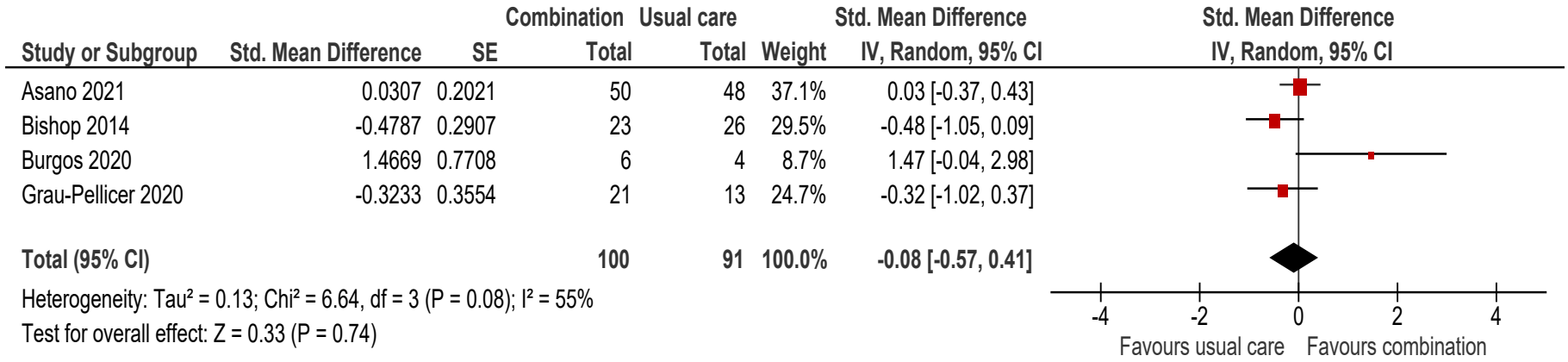


Figure 47: Activities of daily living (Functional Independence Measure, 18-126, higher values are better, change score) at ≥6 months

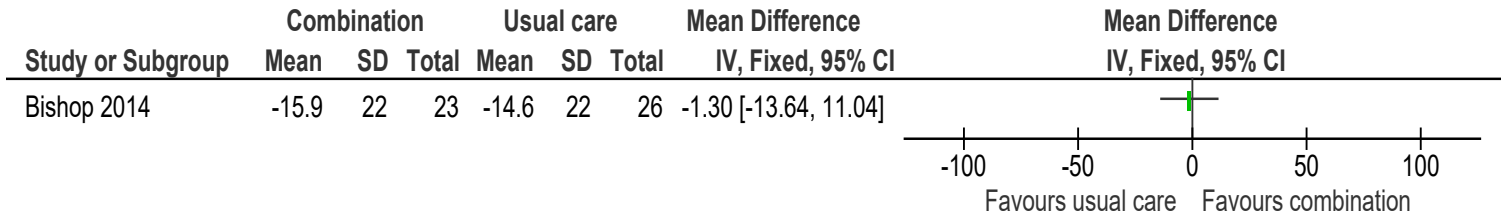


Figure 48: Mobility (timed up and go [seconds], lower values are better, final value) at <6 months

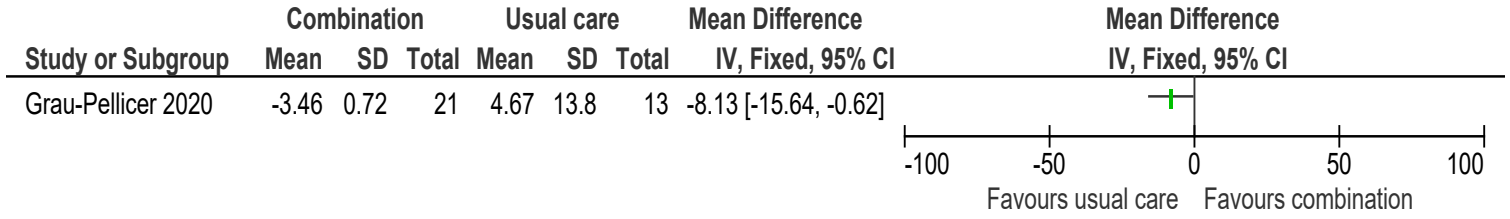


Figure 49: Mobility (2 minute walk test [meters], higher values are better, change score and final value) at <6 months

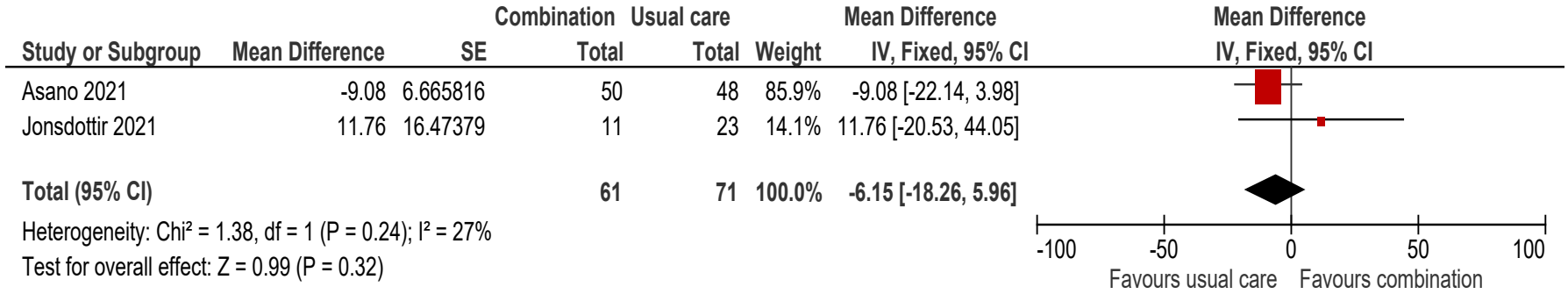


Figure 50: Mobility (2 minute walk test [meters], higher values are better, final value) at ≥6 months

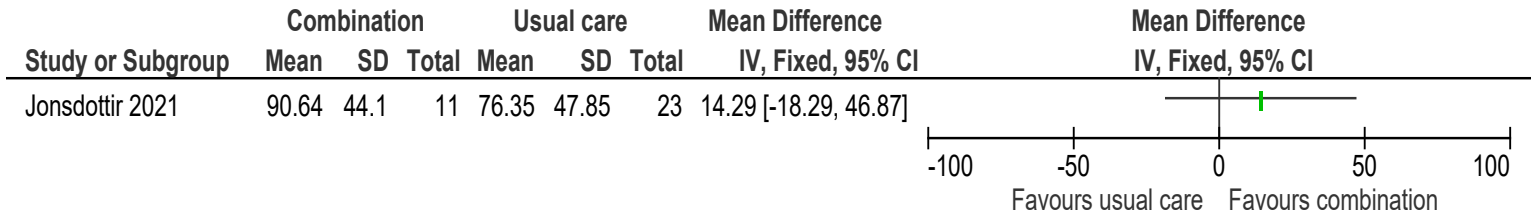


Figure 51: Balance (activities specific balance confidence scale, 0-100, higher values are better, change score) at <6 months

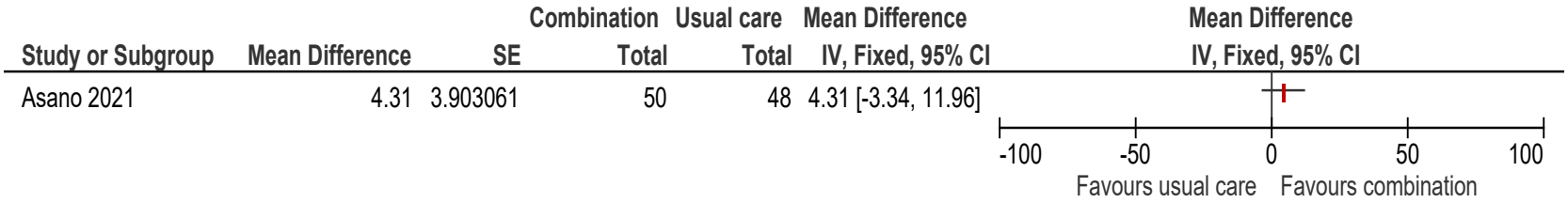


Figure 52: Balance (Berg balance scale, 0-56, higher values are better, change score and final value) at <6 months

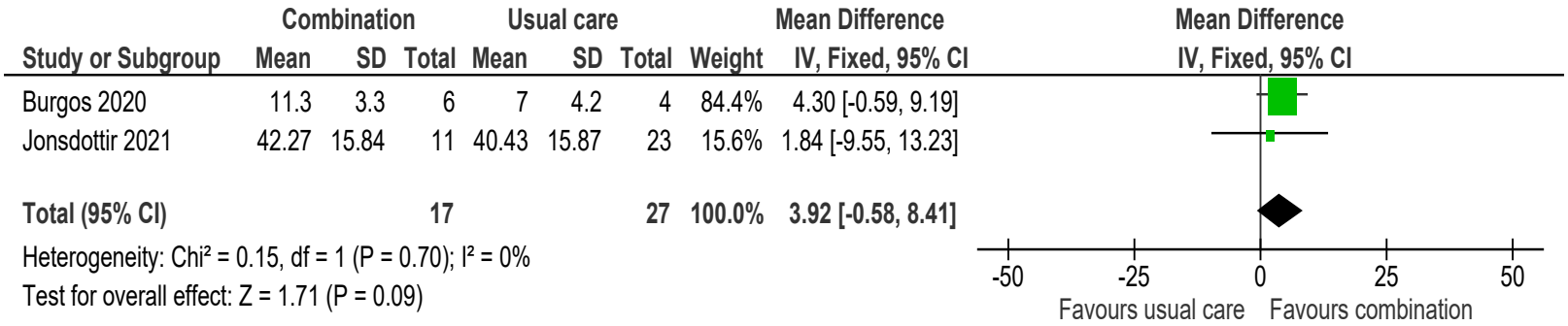


Figure 53: Balance (step test [number of steps], higher values are better, change score) at ≥6 months

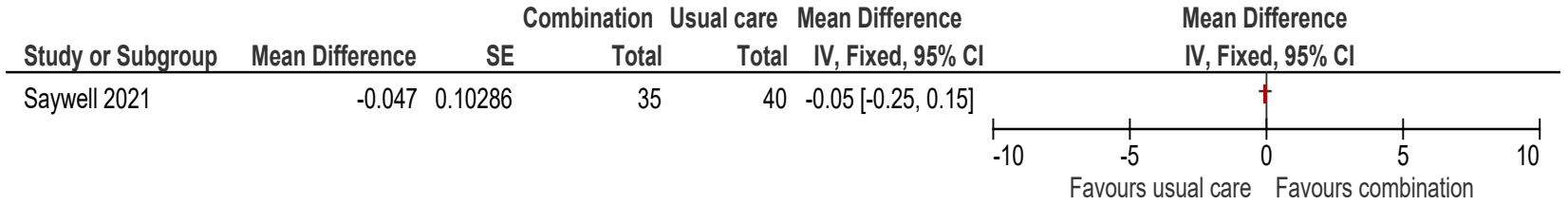


Figure 54: Balance (Berg balance scale, 0-56, higher values are better, final value) at ≥6 months

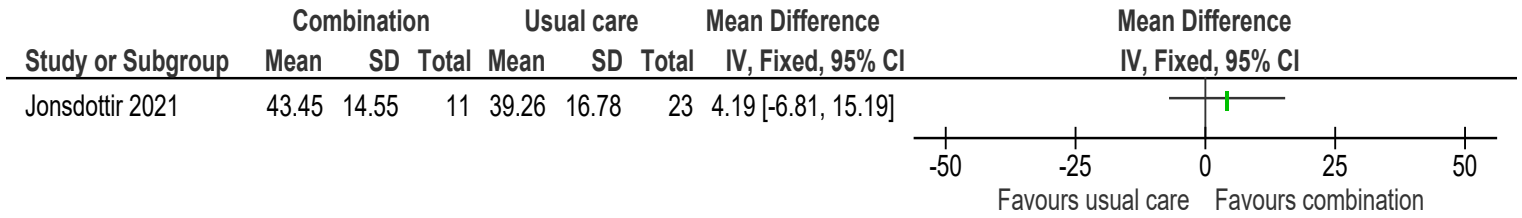


Figure 55: Psychological distress - depression (Geriatric depression scale, 0-15, lower values are better, change score) at <6 months

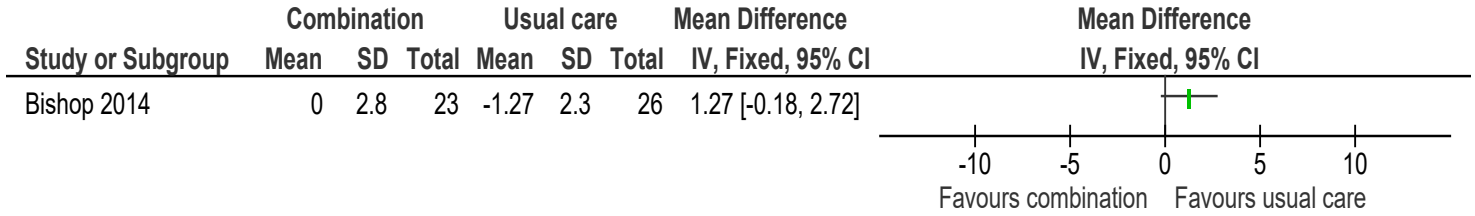


Figure 56: Psychological distress - depression (Geriatric depression scale, 0-15, lower values are better, change score) at ≥6 months

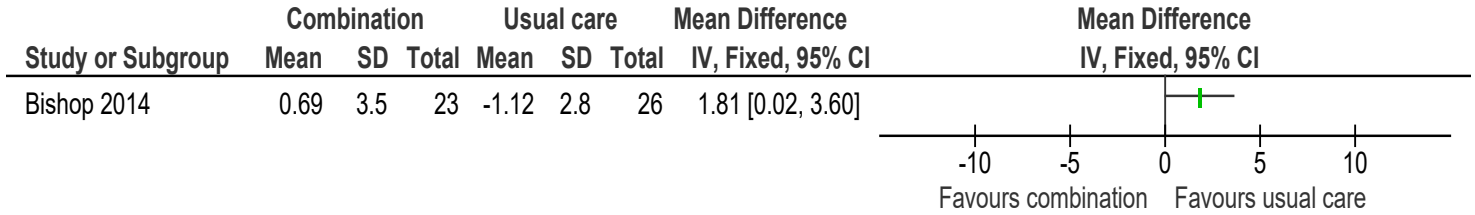


Figure 57: Physical function - upper limb (Wolf motor function test [seconds], higher values are better, change score) at <6 months

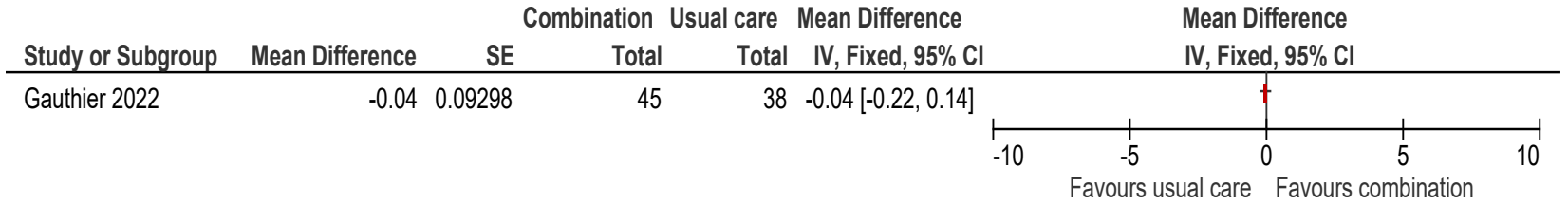


Figure 58: Physical function - upper limb (Action Research Arm Test, Motricity Index [different scale ranges], higher values are better, final values) at <6 months

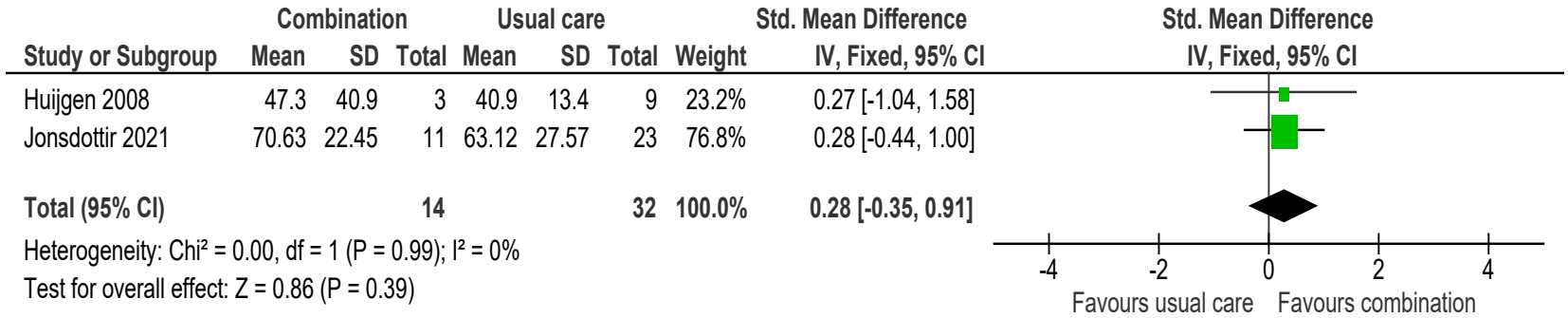


Figure 59: Physical function - upper limb (Wolf motor function test [seconds], higher values are better, change score) at ≥6 months

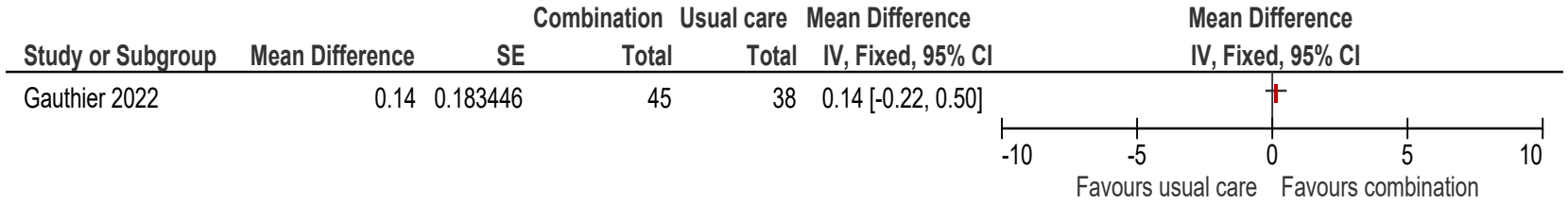


Figure 60: Physical function - upper limb (Motricity index, 0-100, higher values are better, final value) at ≥6 months

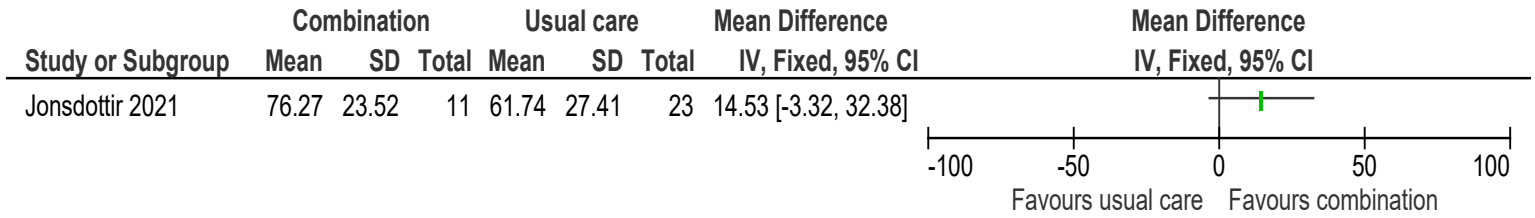


Figure 61: Stroke-specific measures of cognition - memory (Rivermead behavioural memory test, 0-100, higher values are better, change score) at <6 months

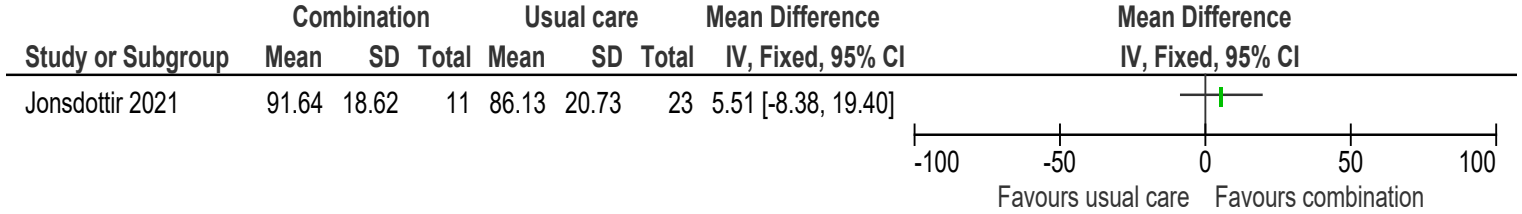


Figure 62: Stroke-specific measures of cognition - memory (Rivermead behavioural memory test, 0-100, higher values are better, change score) at ≥6 months

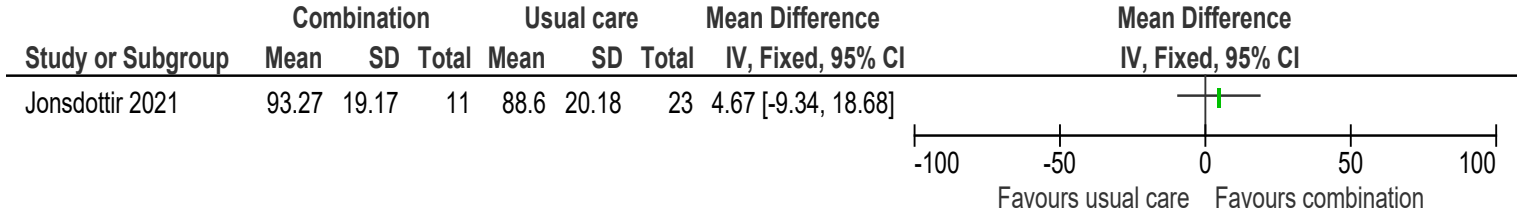


Figure 63: Functional communication (communicative effectiveness index, 0-100, higher values are better, change score) at <6 months

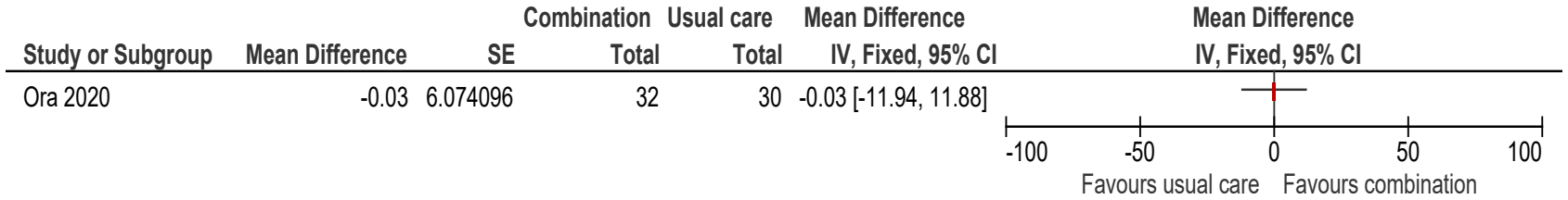


Figure 64: Stroke-specific Patient-Reported Outcome Measure (Stroke Impact Scale, 0-100, higher values are better, change score) at ≥6 months

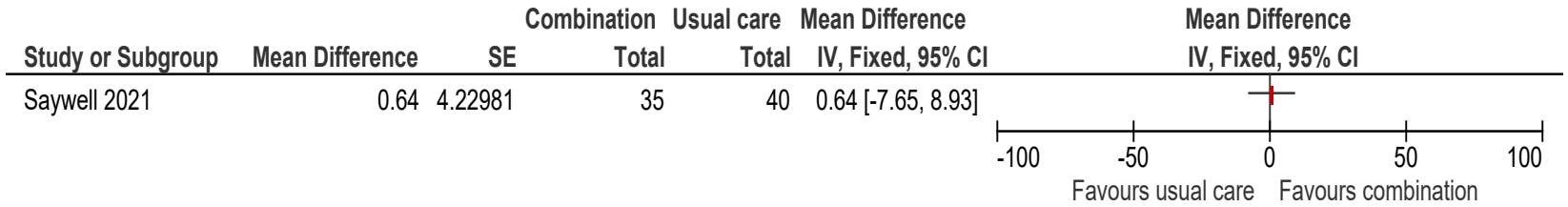


Figure 65: Withdrawal due to adverse events at <6 months

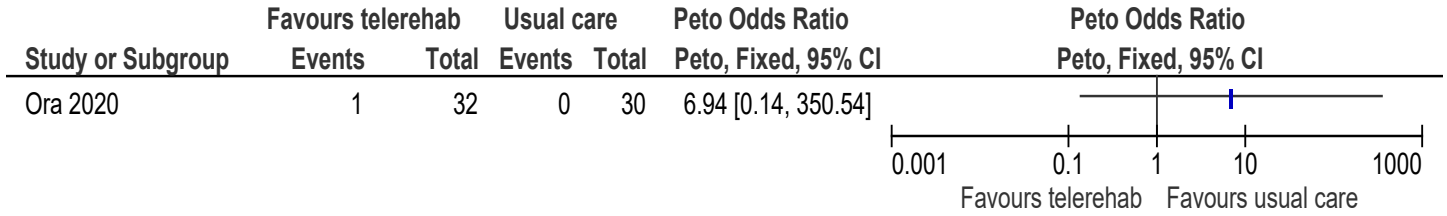
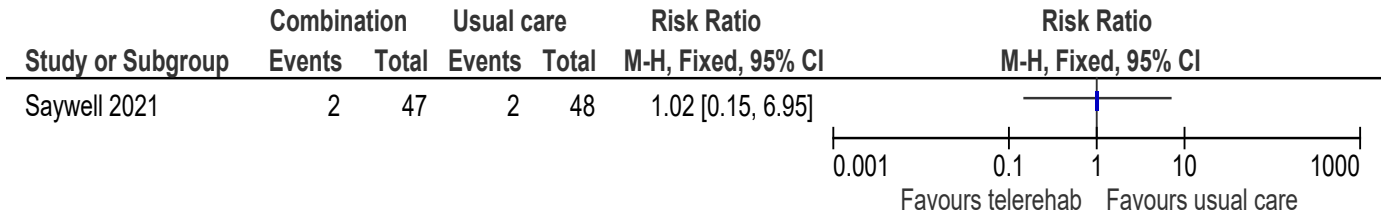


Figure 66: Withdrawal due to adverse events at ≥6 months



Appendix F GRADE tables

Table 11: Clinical evidence profile: telerehabilitation compared to in person rehabilitation

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	telerehabilitation	in person rehabilitation only	Relative (95% CI)	Absolute (95% CI)		
Person/participant generic health-related quality of life (EuroQol-5D, 0-100, higher values are better, final value) at ≥6 months (follow-up: mean 6 months)												
1	randomised trials	very serious[a]	not serious	not serious	not serious	none	15	15	-	MD **13.3 higher** (7.89 higher to 18.71 higher)	⨁⨁◯◯ Low	CRITICAL
Activities of daily living (Barthel index, 0-100, higher values are better, change scores and final value) at <6 months (follow-up: mean 9 weeks)												
3	randomised trials	serious[b]	not serious	not serious	serious[c]	none	60	59	-	MD **4.14 higher** (0.06 higher to 8.23 higher)	⨁⨁◯◯ Low	CRITICAL
Activities of daily living (Barthel index, 0-100, higher values are better, change score) at ≥6 months (follow-up: 6 months)												
1	randomised trials	serious[d]	not serious	not serious	very serious[c]	none	26	24	-	MD **1.52 higher** (4.85 lower to 7.89 higher)	⨁◯◯◯ Very low	CRITICAL
Balance (Berg balance scale, 0-56, higher values are better, change score and final value) at <6 months (follow-up: 2 months)												
2	randomised trials	serious[e]	not serious	not serious	not serious	none	38	37	-	MD **0.95 higher** (1.16 lower to 3.06 higher)	⨁⨁⨁◯ Moderate	CRITICAL
Balance (Berg balance scale, 0-56, higher values are better, change score) at ≥6 months (follow-up: 6 months)												

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	telerehabilitation	in person rehabilitation only	Relative (95% CI)	Absolute (95% CI)		
1	randomised trials	serious[d]	not serious	not serious	not serious	none	26	24	-	MD **0.65 higher** (0.05 lower to 1.35 higher)	⨁⨁⨁◯ Moderate	CRITICAL
Psychological distress - depression (Aphasic depression rating scale, 0-32, lower values are better, change score) at ≥6 months (follow-up: 6 months)												
1	randomised trials	very serious[a]	not serious	not serious	not serious	none	15	15	-	MD **4.2 higher** (2.32 higher to 6.08 higher)	⨁⨁◯◯ Low	CRITICAL
Physical function - upper limb (Fugl-Meyer Assessment Upper Extremity, 0-66, higher values are better, change scores and final values) at <6 months (follow-up: mean 9 weeks)												
4	randomised trials	not serious	not serious	not serious	not serious	none	89	89	-	MD **1.04 higher** (0.83 lower to 2.92 higher)	⨁⨁⨁⨁ High	CRITICAL
Physical function - upper limb (motor assessment log arm use, 0-5, higher values are better, change score) at <6 months (follow-up: 10 days)												
1	randomised trials	very serious[a]	not serious	not serious	very serious[c]	none	10	10	-	MD **0** (0.8 lower to 0.8 higher)	⨁◯◯◯ Very low	CRITICAL
Physical function - upper limb (motor assessment log arm use, 0-5, higher values are better, change score) at ≥6 months (follow-up: 1 years)												
1	randomised trials	very serious[a]	not serious	not serious	very serious[c]	none	7	7	-	MD **0.1 lower** (1.3 lower to 1.1 higher)	⨁◯◯◯ Very low	CRITICAL
Physical function upper limb (Fugl Meyer Assessment, 0-100, higher values are better, change score) at <6 months (follow-up: 12 weeks)												
1	randomised trials	serious[f]	not serious	serious[g]	not serious	none	22	22	-	MD **5.8 higher** (1.61 higher to 9.99 higher)	⨁⨁◯◯ Low	CRITICAL
Stroke-specific measures of cognition - non-spatial attention and working memory (Cognitive linguistic quick test - attention, 0-215, higher values are better, change score) at <6 months (follow-up: 10 weeks)												

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	telerehabilitation	in person rehabilitation only	Relative (95% CI)	Absolute (95% CI)		
1	randomised trials	very serious[h]	not serious	not serious	serious[c]	none	5	6	-	MD **23.1 lower** (50 lower to 3.8 higher)	⨁◯◯◯ Very low	CRITICAL
Stroke-specific measures of cognition - memory (Cognitive linguistic quick test - memory, 0-185, higher values are better, change score) at <6 months (follow-up: 10 weeks)												
1	randomised trials	very serious[h]	not serious	not serious	serious[c]	none	5	6	-	MD **16.9 lower** (37.61 lower to 3.81 higher)	⨁◯◯◯ Very low	CRITICAL
Stroke-specific measures of cognition - executive functions (Cognitive linguistic quick test - executive function, 0-40, higher values are better, change score) at <6 months (follow-up: 10 weeks)												
1	randomised trials	very serious[h]	not serious	not serious	very serious[c]	none	5	6	-	MD **1.5 lower** (5.18 lower to 2.18 higher)	⨁◯◯◯ Very low	CRITICAL
Stroke-specific Patient-Reported Outcome Measures (Stroke impact scale hand function, 0-100, higher values are better, change score) at <6 months (follow-up: 5 months)												
1	randomised trials	very serious[i]	not serious	not serious	not serious	none	4	5	-	MD **65 lower** (102.42 lower to 27.58 lower)	⨁⨁◯◯ Low	CRITICAL
Stroke-specific Patient-Reported Outcome Measures (Stroke impact scale activities of daily living, 0-100, higher values are better, change score) at <6 months (follow-up: 5 months)												
1	randomised trials	very serious[i]	not serious	not serious	serious[c]	none	4	5	-	MD **12.5 lower** (27.69 lower to 2.69 higher)	⨁◯◯◯ Very low	CRITICAL
Stroke-specific Patient-Reported Outcome Measures (Stroke impact scale mobility, 0-100, higher values are better, change score) at <6 months (follow-up: 5 months)												
1	randomised trials	very serious[i]	not serious	not serious	serious[c]	none	4	5	-	MD **7.05 lower** (19.41 lower to 5.31 higher)	⨁◯◯◯ Very low	CRITICAL
Withdrawal due to adverse events at <6 months (follow-up: 10 days)												

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	telerehabilitation	in person rehabilitation only	Relative (95% CI)	Absolute (95% CI)		
1	randomised trials	very serious[h]	not serious	not serious	very serious[c,j]	none	1/12 (8.3%)	0/12 (0.0%)	**OR 7.39** (0.15 to 372.38)	**80 more per 1,000** (from 120 fewer to 290 more)[j]	⨁◯◯◯ Very low	CRITICAL

Withdrawal due to adverse events at ≥6 months (follow-up: 1 years)

1	randomised trials	very serious[h]	not serious	not serious	very serious[c,j]	none	1/12 (8.3%)	0/12 (0.0%)	**OR 7.39** (0.15 to 372.38)	**80 more per 1,000** (from 120 fewer to 290 more)[j]	⨁◯◯◯ Very low	CRITICAL

CI: confidence interval; **MD:** mean difference; **OR:** odds ratio

Explanations

a. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions, bias due to missing outcome data and bias in measurement of the outcome)

b. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to a mixture of bias arising from the randomisation process, bias due to deviations from the intended interventions and bias in selections of the reported results)

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs

d. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias due to deviations from the intended interventions)

e. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to a mixture of bias arising from the randomisation process and bias due to deviations from the intended interventions)

f. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias in selection of the reported result)

g. Downgraded by 1 increment due to outcome indirectness (scale reported the upper and lower limb components of the Fugl Meyer assessment rather than just the upper limb scores)

h. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions and bias due to missing outcome data)

i. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to missing outcome data and bias in measurement of the outcome)

j. Absolute effect calculated by risk difference due to zero events in at least one arm of one study

Table 8: Clinical evidence profile: telerehabilitation compared to usual care

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	telerehabilitation	usual care	Relative (95% CI)	Absolute (95% CI)		
Activities of daily living (Barthel index, 0-100, higher values are better, final value) at <6 months (follow-up: 3 months)												
1	randomised trials	very serious[a]	not serious	not serious	not serious	none	30	31	-	MD **4.26 higher** (1.89 higher to 6.63 higher)	⨁⨁◯◯ Low	CRITICAL
Activities of daily living (Canadian Occupational Performance Measure performance untrained, 1-10, higher values are better, final value) at <6 months (follow-up: 10 weeks)												
1	randomised trials	serious[b]	not serious	not serious	very serious[c]	none	8	9	-	MD **0.5 higher** (1.37 lower to 2.37 higher)	⨁◯◯◯ Very low	CRITICAL
Activities of daily living (Canadian Occupational Performance Measure satisfaction untrained, 1-10, higher values are better, final value) at <6 months (follow-up: 10 weeks)												
1	randomised trials	serious[b]	not serious	not serious	very serious[c]	none	8	9	-	MD **1.02 higher** (1.16 lower to 3.2 higher)	⨁◯◯◯ Very low	CRITICAL
Activities of daily living (Barthel index, 0-100, higher values are better, final value) at ≥6 months (follow-up: 6 months)												
1	randomised trials	serious[b]	not serious	not serious	not serious	none	236	252	-	MD **0** (0.36 lower to 0.36 higher)	⨁⨁⨁◯ Moderate	CRITICAL
Mobility (timed up and go [seconds], lower values are better, final value) at <6 months (follow-up: 3 months)												
1	randomised trials	very serious[a]	not serious	not serious	not serious	none	30	31	-	MD **4.5 seconds lower** (6.03 lower to 2.97 lower)	⨁⨁◯◯ Low	CRITICAL
Mobility (walking speed [meters/second], higher values are better, final value) at <6 months (follow-up: 12 weeks)												

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	telerehabilitation	usual care	Relative (95% CI)	Absolute (95% CI)		
1	randomised trials	very serious[a]	not serious	not serious	serious[c]	none	15	15	-	MD **0.09 meters/second lower** (0.32 lower to 0.14 higher)	⨁◯◯◯ Very low	CRITICAL
Mobility (spanish version trunk impairment scale, 0-16, higher values are better, final value) at <6 months (follow-up: 3 months)												
1	randomised trials	very serious[d]	not serious	not serious	serious[c]	none	13	25	-	MD **0.4 lower** (3.13 lower to 2.33 higher)	⨁◯◯◯ Very low	CRITICAL
Balance (Berg balance scale, 0-56, higher values are better, change score and final values) at <6 months (follow-up: 3 months)												
3	randomised trials	very serious[d]	very serious[a]	not serious	not serious	none	58	71	-	MD **1.96 higher** (2.9 lower to 6.82 higher)	⨁◯◯◯ Very low	CRITICAL
Psychological distress - depression (PHQ-9, 0-27, lower values are better, change score) at <6 months (follow-up: 10 weeks)												
1	randomised trials	serious[b]	not serious	not serious	serious[c]	none	8	9	-	MD **0.38 higher** (1.59 lower to 2.35 higher)	⨁⨁◯◯ Low	CRITICAL
Psychological distress - depression (Center for Epidemiological Studies Depression scale, 0-60, lower values are better, final value) at <6 months (follow-up: 11 weeks)												
1	randomised trials	serious[f]	not serious	not serious	serious[c]	none	15	17	-	MD **3.9 lower** (9.45 lower to 1.65 higher)	⨁⨁◯◯ Low	CRITICAL
Psychological distress - depression (Hospital Anxiety and Depression subscale, 0-100, lower values are better, final value) at ≥6 months (follow-up: 6 months)												
1	randomised trials	serious[b]	not serious	not serious	not serious	none	229	250	-	MD **2.4 higher** (1.2 lower to 6 higher)	⨁⨁⨁◯ Moderate	CRITICAL
Physical function - upper limb (Fugl Meyer Assessment Upper Extremity, Late Life Function and Disability Instrument [different scale ranges], higher values are better, final values) at <6 months (follow-up: mean 12 weeks)												

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	telerehabilitation	usual care	Relative (95% CI)	Absolute (95% CI)		
3	randomised trials	very serious[g]	very serious[e]	not serious	serious[c]	none	57	58	-	SMD **1.04 SD higher** (0.4 lower to 2.47 higher)	⨁◯◯◯ Very low	CRITICAL
Physical function - upper limb (Late Life Function and Disability Instrument, 0-100, higher values are better, final value) at ≥6 months (follow-up: 6 months)												
1	randomised trials	serious[b]	not serious	not serious	serious[c]	none	24	19	-	MD **7.9 higher** (4.07 lower to 19.87 higher)	⨁⨁◯◯ Low	CRITICAL
Stroke-specific Patient-Reported Outcome Measures (Stroke specific Quality of Life, 49-245, higher values are better, final value) at <6 months (follow-up: 3 months)												
1	randomised trials	very serious[a]	not serious	not serious	not serious	none	30	31	-	MD **14.6 higher** (11.87 higher to 17.33 higher)	⨁⨁◯◯ Low	CRITICAL
Withdrawal due to adverse events at <6 months												
2	randomised trials	very serious[h]	serious[i]	not serious	serious[c]	none	5/45 (11.1%)	1/57 (1.8%)	**RR 5.44** (0.93 to 31.89)	**78 more per 1,000** (from 1 fewer to 542 more)	⨁◯◯◯ Very low	CRITICAL

CI: confidence interval; **MD:** mean difference; **RR:** risk ratio; **SMD:** standardised mean difference

Explanations

a. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process and bias due to deviations from the intended interventions)

b. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias due to missing outcome data)

c. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs

d. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions, bias due to missing outcome data and bias in measurement of the outcome)

e. Downgraded by 1 or 2 increments because heterogeneity, unexplained by subgroup analysis

f. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias in measurement of the outcome)

g. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions, bias due to missing outcome data, bias in measurement of the outcome and bias in selection of the reported result)

h. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions, bias due to missing outcome data and bias in measurement of the outcome)

i. Downgraded for heterogeneity due to conflicting number of events in different studies (zero events in one or more studies)

Table 9: Clinical evidence profile: combination of telerehabilitation and in person rehabilitation compared to in person rehabilitation

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	combination of telerehabilitation and in person rehabilitation	in person rehabilitation only	Relative (95% CI)	Absolute (95% CI)		
Person/participant generic health-related quality of life (EQ-5D, -0.11-1, higher values are better, final value) at <6 months (follow-up: 3 weeks)												
1	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	7	7	-	MD **0.02 higher** (0.08 lower to 0.12 higher)	⨁◯◯◯ Very low	CRITICAL
Activities of daily living (Barthel index, 0-100, higher values are better, final value) at <6 months (follow-up: 3 weeks)												
1	randomised trials	not serious	not serious	not serious	very serious[b]	none	7	7	-	MD **1.57 higher** (15.62 lower to 18.76 higher)	⨁⨁◯◯ Low	CRITICAL
Mobility (timed up and go [seconds], lower values are better, final value) at <6 months (follow-up: 3 weeks)												
1	randomised trials	not serious	not serious	not serious	serious[b]	none	7	7	-	MD **12.28 higher** (7.56 lower to 32.12 higher)	⨁⨁⨁◯ Moderate	CRITICAL
Balance (Berg balance scale, 0-56, higher values are better, final values) at <6 months (follow-up: mean 8 weeks)												

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	combination of telerehabilitation and in person rehabilitation	in person rehabilitation only	Relative (95% CI)	Absolute (95% CI)		
2	randomised trials	serious[c]	not serious	not serious	not serious	none	22	22	-	MD **0.07 lower** (2.77 lower to 2.63 higher)	⨁⨁⨁◯ Moderate	CRITICAL
Psychological distress - depression (Hamiliton depression rating scale, 0-56, lower values are better, final value) at <6 months (follow-up: mean 12 weeks)												
2	randomised trials	serious[d]	not serious	not serious	not serious	none	54	46	-	MD **0.23 lower** (2.13 lower to 1.67 higher)	⨁⨁⨁◯ Moderate	CRITICAL
Stroke-specific measures of cognition - non-spatial attention and working memory (attentive matrices, scale range unclear, higher values are better, final value) at <6 months (follow-up: 16 weeks)												
1	randomised trials	very serious[e]	not serious	not serious	serious[b]	none	20	15	-	MD **5.4 higher** (2.25 lower to 13.05 higher)	⨁◯◯◯ Very low	CRITICAL
Stroke-specific measures of cognition - non-spatial attention and working memory (digital span, scale range unclear, higher values are better, final value) at <6 months (follow-up: 16 weeks)												
1	randomised trials	very serious[e]	not serious	not serious	very serious[b]	none	20	15	-	MD **0.4 lower** (5.01 lower to 4.21 higher)	⨁◯◯◯ Very low	CRITICAL
Functional communication (communication activties of daily living, scale range unclear, higher values are better, final value) at <6 months (follow-up: 1 months)												
1	randomised trials	very serious[e]	not serious	not serious	very serious[b]	none	10	10	-	MD **2.8 higher** (20.2 lower to 25.8 higher)	⨁◯◯◯ Very low	CRITICAL

CI: confidence interval; **MD:** mean difference

Explanations

a. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias in measurement of the outcome)

b. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs

c. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias in selection of reported result)

d. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to a mixture of bias arising from the randomisation process, bias due to missing outcome data and bias in measurement of the outcome)

e. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions and bias due to missing outcome data)

Table 10: Clinical evidence profile: combination of telerehabilitation and in person rehabilitation compared to usual care

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	combination of telerehabilitation and in person rehabilitation	usual care	Relative (95% CI)	Absolute (95% CI)		
Person/participant generic health-related quality of life (EQ-5D, -0.11-1, higher values are better, change score) at <6 months (follow-up: 3 months)												
1	randomised trials	very serious[a]	not serious	not serious	very serious[b]	none	50	48	-	MD **0.05 higher** (0.05 lower to 0.15 higher)	⨁◯◯◯ Very low	CRITICAL
Person/participant generic health-related quality of life (EQ-5D-5L, scale range unclear, lower values are better, change score) at <6 months (follow-up: 3 months)												
1	randomised trials	very serious[c]	not serious	not serious	not serious	none	21	13	-	MD **2.88 lower** (3.4 lower to 2.36 lower)	⨁⨁◯◯ Low	CRITICAL
Person/participant generic health-related quality of life (EQ-5D VAS, 0-100, higher values are better, change scores) at ≥6 months (follow-up: 12 months)												
1	randomised trials	very serious[d]	not serious	not serious	serious[b]	none	35	40	-	MD **10.09 lower** (19.03 lower to 1.15 lower)	⨁◯◯◯ Very low	CRITICAL
Activities of daily living (Barthel Index, Functional Independence Measure [different scale ranges], higher values are better, change scores) at <6 months (follow-up: mean 10 weeks)												
4	randomised trials	very serious[e]	serious[f]	not serious	serious[b]	none	100	91	-	SMD **0.08 SD lower** (0.57 lower to 0.41 higher)	⨁◯◯◯ Very low	CRITICAL

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	combination of telerehabilitation and in person rehabilitation	usual care	Relative (95% CI)	Absolute (95% CI)		
Activities of daily living (Functional Independence Measure, 18-126, higher values are better, change score) at ≥6 months (follow-up: 6 months)												
1	randomised trials	very serious[g]	not serious	not serious	not serious	none	23	26	-	MD **1.3 lower** (13.64 lower to 11.04 higher)	⨁⨁◯◯ Low	CRITICAL
Mobility (timed up and go [seconds], lower values are better, final value) at <6 months (follow-up: 3 months)												
1	randomised trials	very serious[h]	not serious	not serious	serious[b]	none	21	13	-	MD **8.13 lower** (15.64 lower to 0.62 lower)	⨁◯◯◯ Very low	CRITICAL
Mobility (2 minute walk test [meters], higher values are better, change score and final value) at <6 months (follow-up: mean 3.5 months)												
2	randomised trials	very serious[a]	not serious	not serious	not serious	none	61	71	-	MD **6.15 lower** (18.26 lower to 5.96 higher)	⨁⨁◯◯ Low	CRITICAL
Mobility (2 minute walk test [meters], higher values are better, final values) at ≥6 months (follow-up: 7 months)												
1	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	11	23	-	MD **14.29 higher** (18.29 lower to 46.87 higher)	⨁◯◯◯ Very low	CRITICAL
Balance (activities specific balance confidence scale, 0-100, higher values are better, change score) at <6 months (follow-up: 3 months)												
1	randomised trials	very serious[a]	not serious	not serious	not serious	none	50	48	-	MD **4.31 higher** (3.34 lower to 11.96 higher)	⨁⨁◯◯ Low	CRITICAL
Balance (Berg balance scale, 0-56, higher values are better, change score and final value) at <6 months (follow-up: mean 10 weeks)												

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	combination of telerehabilitation and in person rehabilitation	usual care	Relative (95% CI)	Absolute (95% CI)		
2	randomised trials	very serious[d]	not serious	not serious	serious[b]	none	17	27	-	MD **3.92 higher** (0.58 lower to 8.41 higher)	⨁◯◯◯ Very low	CRITICAL
Balance (step test [number of steps], higher values are better, change score) at ≥6 months (follow-up: 12 months)												
1	randomised trials	serious[i]	not serious	not serious	not serious	none	35	40	-	MD **0.05 lower** (0.25 lower to 0.15 higher)	⨁⨁⨁◯ Moderate	CRITICAL
Balance (Berg balance scale, 0-56, higher values are better, final value) at ≥6 months (follow-up: 7 months)												
1	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	11	23	-	MD **4.19 higher** (6.81 lower to 15.19 higher)	⨁◯◯◯ Very low	CRITICAL
Psychological distress - depression (Geriatric depression scale, 0-15, lower values are better, change score) at <6 months (follow-up: 3 months)												
1	randomised trials	very serious[g]	not serious	not serious	serious[b]	none	23	26	-	MD **1.27 higher** (0.18 lower to 2.72 higher)	⨁◯◯◯ Very low	CRITICAL
Psychological distress - depression (Geriatric depression scale, 0-15, lower values are better, change score) at ≥6 months (follow-up: 6 months)												
1	randomised trials	very serious[g]	not serious	not serious	serious[b]	none	23	26	-	MD **1.81 higher** (0.02 higher to 3.6 higher)	⨁◯◯◯ Very low	CRITICAL
Physical function - upper limb (Wolf motor function test [seconds], higher values are better, change score) at <6 months (follow-up: 3 weeks)												

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	combination of telerehabilitation and in person rehabilitation	usual care	Relative (95% CI)	Absolute (95% CI)		
1	randomised trials	serious[i]	not serious	not serious	not serious	none	45	38	-	MD **0.04 lower** (0.22 lower to 0.14 higher)	⨁⨁⨁◯ Moderate	CRITICAL
Physical function - upper limb (Action Research Arm Test, Motricity Index [different scale ranges], higher values are better, final values) at <6 months (follow-up: mean 3 months)												
2	randomised trials	serious[i]	not serious	not serious	serious[b]	none	14	32	-	SMD **0.28 SD higher** (0.35 lower to 0.91 higher)	⨁⨁◯◯ Low	CRITICAL
Physical function - upper limb (Wolf motor function test [seconds], higher values are better, change score) at ≥6 months (follow-up: 6 months)												
1	randomised trials	serious[i]	not serious	not serious	not serious	none	45	38	-	MD **0.14 higher** (0.22 lower to 0.5 higher)	⨁⨁⨁◯ Moderate	CRITICAL
Physical function - upper limb (Motricity index, 0-100, higher values are better, final value) at ≥6 months (follow-up: 7 months)												
1	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	11	23	-	MD **14.53 higher** (3.32 lower to 32.38 higher)	⨁◯◯◯ Very low	CRITICAL
Stroke-specific measures of cognition - memory (Rivermead behavioural memory test, 0-100, higher values are better, change score) at <6 months (follow-up: 4 months)												
1	randomised trials	serious[i]	not serious	not serious	serious[b]	none	11	23	-	MD **5.51 higher** (8.38 lower to 19.4 higher)	⨁⨁◯◯ Low	CRITICAL
Stroke-specific measures of cognition - memory (Rivermead behavioural memory test, 0-100, higher values are better, change score) at ≥6 months (follow-up: 7 months)												

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	combination of telerehabilitation and in person rehabilitation	usual care	Relative (95% CI)	Absolute (95% CI)		
1	randomised trials	very serious[a]	not serious	not serious	very serious[b]	none	11	23	-	MD **4.67 higher** (9.34 lower to 18.68 higher)	⨁◯◯◯ Very low	CRITICAL
Functional communication (communicative effectiveness index, 0-100, higher values are better, change score) at <6 months (follow-up: 16 weeks)												
1	randomised trials	not serious	not serious	not serious	not serious	none	32	30	-	MD **0.03 lower** (11.94 lower to 11.88 higher)	⨁⨁⨁⨁ High	CRITICAL
Stroke-specific Patient-Reported Outcome Measure (Stroke Impact Scale, 0-100, higher values are better, change score) at ≥6 months (follow-up: 12 months)												
1	randomised trials	very serious[d]	not serious	not serious	not serious	none	35	40	-	MD **0.64 higher** (7.65 lower to 8.93 higher)	⨁⨁◯◯ Low	CRITICAL
Withdrawal due to adverse events at <6 months												
1	randomised trials	not serious	not serious	not serious	very serious[b,k]	none	1/32 (3.1%)	0/30 (0.0%)	**OR 6.94** (0.14 to 350.54)	**30 more per 1,000** (from 50 fewer to 120 more)[k]	⨁⨁◯◯ Low	CRITICAL
Withdrawal due to adverse events at ≥6 months												
1	randomised trials	very serious[d]	not serious	not serious	very serious[b]	none	2/47 (4.3%)	2/48 (4.2%)	**RR 1.02** (0.15 to 6.95)	**1 more per 1,000** (from 35 fewer to 248 more)	⨁◯◯◯ Very low	CRITICAL

CI: confidence interval; **MD:** mean difference; **OR:** odds ratio; **RR:** risk ratio; **SMD:** standardised mean difference

Explanations

a. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process and bias due to missing outcome data)

b. Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs

c. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions and bias in measurement of the outcome)

d. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias due to missing outcome data and bias in measurement of the outcome)

e. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process, bias due to deviations from the intended interventions, bias due to missing outcome data and bias in measurement of the outcome)

f. Downgraded by 1 or 2 increments because heterogeneity, unexplained by subgroup analysis

g. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process)

h. Downgraded by 2 increments as the majority of the evidence was of very high risk of bias (due to bias arising from the randomisation process and bias due to deviations from the intended interventions)

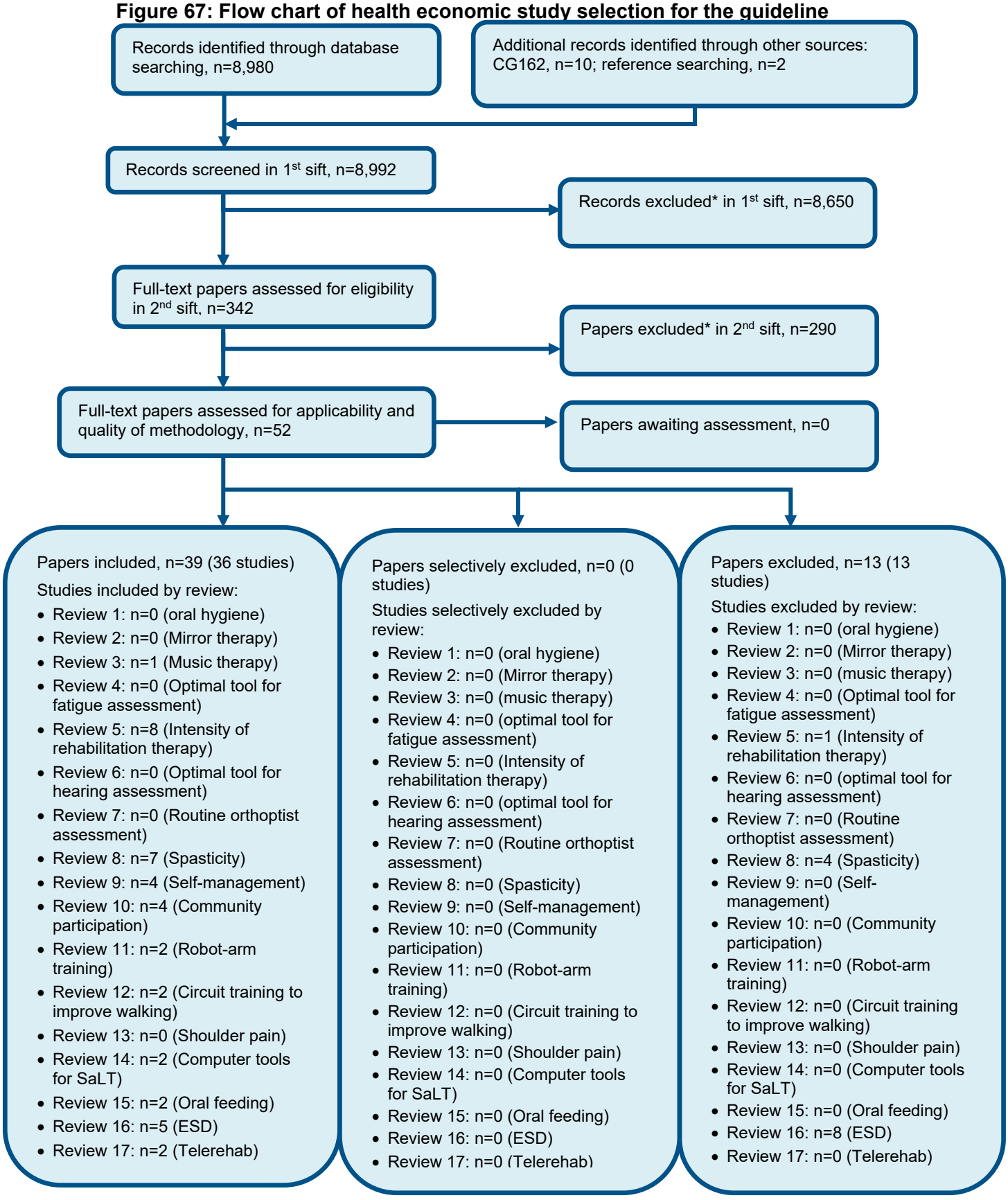
i. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias due to missing outcome data)

j. Downgraded by 1 increment as the majority of the evidence was of high risk of bias (due to bias arising from the randomisation process)

k. Absolute effect calculated by risk difference due to zero events in at least one arm of one study

Appendix G Economic evidence study selection

Figure 67: Flow chart of health economic study selection for the guideline



* Non-relevant population, intervention, comparison, design or setting; non-English language

Appendix H Economic evidence tables

Study	Llorens 2015[23]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: Cost-effectiveness analysis (health outcome: Berg Balance scale). **Study design:** Within-trial analysis (single-blind RCT – same paper) without any modelled extrapolation. **Approach to analysis:** Intervention costs over the 8-week intervention period were collected for both groups. Unit costs applied according to the Spanish framework. **Perspective:** Spanish healthcare system **Follow-up:** 12 weeks **Treatment effect duration:**[(a)] 8-week treatment duration **Discounting:** NA	**Population:** Outpatients attending a neurorehabilitation unit who were >6 months post-stroke and had internet access in their homes. **Patient characteristics:** N=30 Mean age: 55 Male: 56% **Intervention 1:** VR-based balance recovery programme conducted in the clinic plus usual rehabilitation (n=15). Twenty 45-minute sessions were conducted 3 times per week for 8 weeks. A physical therapist monitored the performance of the participant with the system while assisting other patients. **Intervention 2:** VR-based balance recovery telerehabilitation programme conducted in the participant's home plus usual rehabilitation (n=15). Twenty 45-minute sessions were conducted 3 times per week for 8 weeks. Progress was monitored	**Total costs (mean per patient):** Intervention 1: £1,041 Intervention 2: £584 Incremental (2−1): Saves £457 (95% CI: NR; p=NR) **Currency & cost year:** 2014 USD ($) converted to UK pounds (£)[(b)] **Cost components incorporated:** Human resources (time spent on assistance and guidance during the intervention, monitoring of progress, and troubleshooting), round trips to the neurorehabilitation unit, and instrumentation (laptop, Kinect camera (to record patients' movements), and Internet access).	**From clinical review (2 vs 1):**[(c)] **Balance (BBS, final values) at <6 months:** 0.26 (95% CI: -2.53 to 3.05)	**ICER (Intervention 2 versus Intervention 1):** NR Probability Intervention 2 cost effective (£20K threshold): NR Results suggest that home-based VR balance recovery telerehabilitation is dominant (lower costs and improved outcomes) compared to in-person VR balance training, however no significant differences were found between the groups in any balance scale or in the feedback questionnaires. **Analysis of uncertainty:** None.

	remotely by a physical therapist once per week.			

Data sources
Health outcomes: Within-trial analysis of a single-blind RCT[23] included in the clinical review which used the Berg Balance Scale (BBS) as the primary outcome to measure the balance control of all participants at baseline, 8 weeks (post-treatment) and 12 weeks (follow-up). Secondary outcome measures were the Performance-Oriented Mobility Assessment balance subscale (POMA-B), the Performance-Oriented Mobility Assessment gait subscale (POMA-G) and the Brunel Balance Assessment (BBA). **Quality-of-life weights**: None. **Cost sources:** References for unit costs (including cost year) were not reported. Prices were estimated according to "the Spanish framework". Some assumptions were made to estimate the cost of each item. First, the mean base salary for physical therapist was £2,518 for 22 business days with a 7.5-hour schedule. The cost of 1 hour of physical therapy was £15.26 and patient transport costs to the clinic were assumed to cost £23 for a 1-way trip.
Comments
Source of funding: Spanish Ministry of Economy and Competitiveness, Ministry of Education and Science, and the Excellence Research Program PROMETEO. **Limitations:** QALYs (and cost per QALY gained) were not presented. 2014 Spanish healthcare system may not reflect UK NHS context. Within-trial analysis based on a single RCT and so only reflects this study and not the wider evidence base identified in the clinical review. 12-week follow-up period may not sufficiently assess the full costs and benefits. References for unit costs (including cost year) were not reported which limits interpretation of results for UK context. No sensitivity analyses were performed on parameters of uncertainty. **Other:** None.
Overall applicability:[(d)] Partially applicable **Overall quality:**[(e)] Potentially serious limitations

Abbreviations: 95% CI= 95% confidence interval; BBA= Brunel Balance Assessment; BBS= Berg Balance Scale (scale: 0-56, higher values are better); ICER= incremental cost-effectiveness ratio; NA= not applicable; NR= not reported; POMA-B= Performance-Oriented Mobility Assessment balance subscale; POMA-G; Performance-Oriented Mobility Assessment gait subscale (POMA-G); QALYs= quality-adjusted life years; RCT=randomised controlled trial; USD= United states dollars ($)

a) *For studies where the time horizon is longer than the treatment duration, an assumption needs to be made about the continuation of the study effect. For example, does a difference in utility between groups during treatment continue beyond the end of treatment and if so for how long.*
b) *Converted using 2014 purchasing power parities[29]*
c) *Mean difference taken from figure 34 of guideline clinical review*
d) *Directly applicable / Partially applicable / Not applicable*
e) *Minor limitations / Potentially serious limitations / Very serious limitations*

Study	**Veras 2020[37]**			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost effectiveness**
Economic analysis: Comparative cost analysis (No health outcomes).	**Population:** Post-stroke adults with mild to moderate upper limb impairment (score 3-6 Chedoke-McMaster) who were no longer receiving rehabilitation services.	**Total costs (mean per patient):** Intervention 1: NR Intervention 2: NR	NR	**ICER (Intervention 2 versus Intervention 1):** NR

Study design: Within-trial analysis (single-blind pilot RCT –NR). **Approach to analysis:** Costing analysis in which incremental costs of the 4-week intervention were collected to find fixed and variable costs per participant. These were then applied to a hypothetical scenario which estimated the cost of a fully operational permanent programme which assumed continuous use by patients by extrapolating the total pilot 4-week programme costs to one year. This scenario assumed each set of equipment could be used by 10 patients per year, allowing one week for the equipment to be switched between patients. 3% discount rate was applied to annualised equipment costs. **Perspective:** Canadian societal system **Follow-up:** 4 weeks **Treatment effect duration:**[a] NA **Discounting:** 3% for equipment costs.	**Patient characteristics:** N=51 Mean age: NR Male: NR **Intervention 1:** Control group (n=25). Participants received a written home exercise programme during an initial PT appointment and were asked to perform exercises at least 5 times per week for 30 minutes a day, for 4 weeks. There were no additional PT visits. **Intervention 2:** Home-based telerehabilitation (TR) platform (Jintronix system) using virtual reality (VR) plus the written exercise programme (n=26). Participants were introduced to the system during an initial PT appointment, during which the at-home exercise programme was designed for the participant. Participant performance was logged by the TR platform and monitored off-line by the therapist (total monitoring time of 75 minutes).	Incremental (2−1): £400 (95% CI: NR; p=NR) **Total costs minus computer equipment and internet access[b] (mean per patient):** Intervention 1: NR Intervention 2: NR Incremental (2−1): £163 (95% CI: NR; p=NR) **Currency & cost year:** 2015 CAD ($) converted to UK pounds (£)[c] **Cost components incorporated:** VR hardware (computer, screen, keyboard, mouse, Internet connection, and the Kinect camera), monthly fees for software rental and internet access, installation and removal of equipment and staff time for physiotherapist (to monitor performance) and VR technician (to assist with hardware issues).		Probability Intervention 2 cost effective (£20K threshold): NR **Analysis of uncertainty:** Hypothetical scenario of a permanent 1-month programme used by 40 participants per year was estimated to have a total incremental cost of £264 per person (£135 if participants do not require computer equipment and internet access).
Data sources				

Health outcomes: NR **Quality-of-life weights**: None. **Cost sources:** References for unit costs were not reported. Estimates of variable costs (such as monthly fees for software rental and internet access and staff time for monitoring, hardware assistance and the installation and removal of equipment) were collected within the study. The annualised incremental fixed cost for the full-equipment and camera-only programmes were estimated using a 3% social discount rate based on guidance from the Canadian Treasury.[14]
Comments
Source of funding: The Heart and Stroke Foundation of Canada. **Limitations:** QALYs (and cost per QALY gained) were not presented. 2015 Canadian societal perspective may not reflect UK NHS context. No health outcomes reported. Within-trial analysis based on a single-blind RCT not included in the clinical review and so only reflects this study. 4-week follow-up may not sufficiently assess the full costs. References for unit costs were not reported which limits interpretation of results for UK context. No probabilistic sensitivity analyses were performed. **Other:** None.
Overall applicability:[(d)] Partially applicable **Overall quality:**[(e)] Potentially serious limitations

Abbreviations: 95% CI= 95% confidence interval; CAD= Canadian dollars; ICER= incremental cost-effectiveness ratio; NA= not applicable; NR= not reported; PT= Physiotherapist; QALYs= quality-adjusted life years; RCT=randomised controlled trial

a) *For studies where the time horizon is longer than the treatment duration, an assumption needs to be made about the continuation of the study effect. For example, does a difference in utility between groups during treatment continue beyond the end of treatment and if so for how long.*
b) *Costed as such to account for participants already in possession of the necessary computer equipment and internet access at home, but not the Kinetic camera to record their exercise programme.*
c) *Converted using 2015 purchasing power parities[29]*
d) *Directly applicable / Partially applicable / Not applicable*
e) *Minor limitations / Potentially serious limitations / Very serious limitations*

Appendix I Health economic model

This area was not prioritised for new cost-effectiveness analysis.

Appendix J Excluded studies

J.1 Clinical studies

Table 12: Studies excluded from the clinical review

Study	Code [Reason]
(2010) Remote supervision of stroke therapy is safe and effective at smaller hospitals. AHRQ Research Activities: 10-11	- Conference abstract
(2012) Effectiveness of video-based therapy for stroke patients. Journal of Rehabilitation Medicine (Stiftelsen Rehabiliteringsinformation): 50-50	- Conference abstract
ACTRN12616001056482 (2016) Efficacy of computer versus group memory training for memory rehabilitation post-stroke. http://www.anzctr.org.au/ACTRN12616001056482.aspx	- Full text paper not available
Adie, Katja and James, Martin A (2010) Does telephone follow-up improve blood pressure after minor stroke or TIA?. Age and ageing 39(5): 598-603	- Population not relevant to this review protocol *>20% had a transient ischaemic attack*
Agostini, M., Garzon, M., Benavides-Varela, S. et al. (2014) Telerehabilitation in poststroke anomia. BioMed Research International 2014: 706909	- Data not reported in an extractable format or a format that can be analysed *No useable results as data presented as percentages*
Aguirre, Luis G, Urrunaga-Pastor, Diego, Lazo-Porras, Maria et al. (2018) Post-stroke rehabilitation devices offered via the Internet: Based on randomized controlled evidence?. Annals of physical and rehabilitation medicine 61(1): 54-55	- Study design not relevant to this review protocol
AHC, MEDIA (2021) Employing Technology and Exergames to Improve Balance Post-Stroke. Integrative Medicine Alert 24(4): 1-3	- Study design not relevant to this review protocol *Grey literature*
Aimola, Lina, Lane, Alison R, Smith, Daniel T et al. (2014) Efficacy and feasibility of home-based training for individuals with homonymous visual field defects. Neurorehabilitation and neural repair 28(3): 207-18	- Comparator in study does not match that specified in this review protocol *Comparison between reading therapy and usual care rather than telerehabilitation and usual care*
Alhatou, A. and Alhatou, M. (2017) Onsite consultation by neurologist vs. tele-neurology, referring physician satisfaction. Neurology 88(16supplement1)	- Conference abstract

Study	Code [Reason]
Amerschalk, Bart M.; Vargas, Jason E.; Channer, Dwight D. (2011) Reaching out: smartphone teleradiology application can be incorporated into a telestroke environment. RT Image 24(5): 24-22	- Full text paper not available
Appleby, Emma, Gill, Sophie Taylor, Hayes, Lucinda Kate et al. (2019) Effectiveness of telerehabilitation in the management of adults with stroke: A systematic review. PloS one 14(11): e0225150	- Systematic review used as source of primary studies
Aprile, I., Gallotti, M., Schirru, M. et al. (2022) Robotic telerehabilitation: a feasibility study in patients with stroke. Gait & Posture 97: npag-npag	- Conference abstract
Arri, Eunate Arana, Ortiz-Fernández, Leire, Orcajo, Janire et al. (2020) PP316 Efficacy And Usability Of eHealth Technologies In Stroke Survivors For Improvement Of Self-Management: Clinical Trial. International Journal of Technology Assessment in Health Care 36(s1): 28-28	- Conference abstract
Asano, M, Tai, BC, Chen, C et al. (2018) Home-based tele-rehabilitation presents comparable and positive impact on self-reported functional outcomes as center-based rehabilitation: singapore tele-technology aided rehabilitation in stroke (STARS) trial. Annals of physical and rehabilitation medicine	- Conference abstract
Bagot, KL, Cadilhac, DA, Hand, PJ et al. (2016) Telemedicine expedites access to optimal acute stroke care. Lancet 388(10046): 757-8	- Conference abstract
Ballantyne, Rachael and Rea, Paul M (2019) A Game Changer: 'The Use of Digital Technologies in the Management of Upper Limb Rehabilitation'. Advances in experimental medicine and biology 1205: 117-147	- Not a peer-reviewed publication
BARRETT, David (2015) Systematic review summary - Telerehabilitation Services for Stroke. Singapore Nursing Journal 42(2): 31-32	- Study design not relevant to this review protocol *Summary report of a Cochrane review that is now out of date*
Baykal, D. and Tulek, Z. (2022) The effect of discharge training on quality of life, self-efficacy and reintegration to normal living in stroke patients and their informal caregivers: A randomized controlled trial. Neurology Asia 27(1): 73-82	- Study does not contain an intervention relevant to this review protocol *Education provided before discharge from hospital by a webpage or in a booklet form - one direction provision of information and therefore is unlikely to be telerehabilitation*

Study	Code [Reason]
Bellomo, R.G., Paolucci, T., Saggino, A. et al. (2020) The WeReha Project for an Innovative Home-Based Exercise Training in Chronic Stroke Patients: A Clinical Study. Journal of Central Nervous System Disease 12	- Study design not relevant to this review protocol
Bhatnagar, K.; Bever, C.T.; Conroy, S. (2018) Correlating home-based upper extremity activity monitoring with clinical evaluations for chronic moderate to severe hemiparesis post-stroke. Annals of Neurology 84(supplement22): 55	- Conference abstract
Birns, J.; Roots, A.; Bhalla, A. (2013) Role of telemedicine in the management of acute ischemic stroke. Clinical Practice 10(2): 189-200	- Systematic review used as source of primary studies
Bizzi, E (2002) Telerehabilitation for motor retraining in stroke. CRISP (computer retrieval of information on scientific projects) database. http://crisp.cit.nih.gov/	- Full text paper not available
Bowman, Thomas, Gervasoni, Elisa, Arienti, Chiara et al. (2021) Wearable Devices for Biofeedback Rehabilitation: A Systematic Review and Meta-Analysis to Design Application Rules and Estimate the Effectiveness on Balance and Gait Outcomes in Neurological Diseases. Sensors (Basel, Switzerland) 21(10)	- Systematic review used as source of primary studies
Braley, M., De Oliveira, E., Munsell, M. et al. (2020) A Phase II Randomized, Virtual, Clinical Trial of Speech Therapy App for Speech, Language, and Cognitive Intervention in Stroke. Archives of Physical Medicine and Rehabilitation 101(11): e62	- Conference abstract
Braley, Michelle, Pierce, Jordyn Sims, Saxena, Sadhvi et al. (2021) A Virtual, Randomized, Control Trial of a Digital Therapeutic for Speech, Language, and Cognitive Intervention in Post-stroke Persons With Aphasia. Frontiers in neurology 12: 626780	- Comparator in study does not match that specified in this review protocol *Both groups complete videoconferencing follow up with a therapist (while each group receive different forms of delivery of the intervention)*
Bramanti, Alessia; Manuli, Alfredo; Salvatore Calabrò, Rocco (2018) STROKE TELEREHABILITATION IN SICILY: A COST-EFFECTIVE APPROACH TO REDUCE DISABILITY?. Innovations in Clinical Neuroscience 15(12): 11-12	- Study design not relevant to this review protocol *Letter only*
Broderick, M, Almedom, L, Burdet, E et al. (2021) Self-directed exergaming for stroke upper limb impairment increases exercise dose compared to standard care. Neurorehabilitation and Neural Repair 35(11): 974-85	- Study design not relevant to this review protocol

Study	Code [Reason]
Broeren, Jurgen, Claesson, Lisbeth, Goude, Daniel et al. (2008) Virtual rehabilitation in an activity centre for community-dwelling persons with stroke. The possibilities of 3-dimensional computer games. Cerebrovascular diseases (Basel, Switzerland) 26(3): 289-96	- Study design not relevant to this review protocol *Pseudo-randomised study (initial 6 people were not randomised, which makes it appear that the study as a whole is not sufficiently randomised)*
Buick, Alison R, Kowalczewski, Jan, Carson, Richard G et al. (2016) Tele-Supervised FES-Assisted Exercise for Hemiplegic Upper Limb. IEEE transactions on neural systems and rehabilitation engineering : a publication of the IEEE Engineering in Medicine and Biology Society 24(1): 79-87	- Study design not relevant to this review protocol *Single arm trial*
Burdea, Grigore C, Grampurohit, Namrata, Kim, Nam et al. (2020) Feasibility of integrative games and novel therapeutic game controller for telerehabilitation of individuals chronic post-stroke living in the community. Topics in stroke rehabilitation 27(5): 321-336	- Study design not relevant to this review protocol
Byl, Nancy N, Abrams, Gary M, Pitsch, Erica et al. (2013) Chronic stroke survivors achieve comparable outcomes following virtual task specific repetitive training guided by a wearable robotic orthosis (UL-EXO7) and actual task specific repetitive training guided by a physical therapist. Journal of hand therapy : official journal of the American Society of Hand Therapists 26(4): 343-352	- Study does not contain an intervention relevant to this review protocol *Intervention took place in a rehabilitation centre under supervision*
Cacciante, Luisa, Kiper, Pawel, Garzon, Martina et al. (2021) Telerehabilitation for people with aphasia: A systematic review and meta-analysis. Journal of communication disorders 92: 106111	- Systematic review used as source of primary studies
Cadilhac, D., Andrew, N., Busingye, D. et al. (2018) Pilot randomised controlled trial of an e-health discharge support intervention for stroke. International Journal of Stroke 13(2supplement1): 49-50	- Conference abstract
Cadilhac, Dominique A, Andrew, Nadine E, Busingye, Doreen et al. (2020) Pilot randomised clinical trial of an eHealth, self-management support intervention (iVERVE) for stroke: feasibility assessment in survivors 12-24 months post-event. Pilot and feasibility studies 6(1): 172	- Study does not contain an intervention relevant to this review protocol *Not delivering rehabilitation therefore likely not relevant*
Cai, Huihui, Lin, Tao, Chen, Lina et al. (2021) Evaluating the effect of immersive virtual reality technology on gait rehabilitation in stroke patients: a study protocol for a randomized controlled trial. Trials 22(1): 91	- Study design not relevant to this review protocol

Study	Code [Reason]
Capampangan, Dan J, Wellik, Kay E, Bobrow, Bentley J et al. (2009) Telemedicine versus telephone for remote emergency stroke consultations: a critically appraised topic. The neurologist 15(3): 163-6	- Study does not contain an intervention relevant to this review protocol *Discusses telemedicine rather than telerehabilitation (discusses stroke care before hospital admission rather than rehabilitation care)*
Carbajal Galarza, M., Abanto Perez, S., Chinchihualpa Paredes, N. et al. (2021) Effectiveness of technological interventions to improve upper limb motor function in people with stroke in low-and middleincome countries: A systematic review and meta-analysis. International Journal of Stroke 16(2suppl): 49	- Conference abstract
Carey, James R, Durfee, William K, Bhatt, Ela et al. (2007) Comparison of finger tracking versus simple movement training via telerehabilitation to alter hand function and cortical reorganization after stroke. Neurorehabilitation and neural repair 21(3): 216-32	- Comparator in study does not match that specified in this review protocol *Compares two different types of telerehabilitation, which was not a valid comparison listed in the protocol for this review (this study was included in the Cochrane review)*
Cassarly, Christy, Doyle, Anna, Ly, Trinh et al. (2021) Speech Entrainment for Aphasia Recovery (SpARc) phase II trial design. Contemporary clinical trials communications 24: 100876	- Study design not relevant to this review protocol
Cassel, S. (2016) A comparison of traditional face-to-face and tele-dysphagia instructional methods in geriatric TBI and CVA populations. Archives of Physical Medicine and Rehabilitation 97(10): e16-e17	- Conference abstract
Cha, Yu-Jin and Kim, Hee (2013) Effect of computer-based cognitive rehabilitation (CBCR) for people with stroke: a systematic review and meta-analysis. NeuroRehabilitation 32(2): 359-68	- Full text paper not available
Chen, Jing, Jin, Wei, Zhang, Xiao-Xiao et al. (2015) Telerehabilitation Approaches for Stroke Patients: Systematic Review and Meta-analysis of Randomized Controlled Trials. Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association 24(12): 2660-8	- Systematic review used as source of primary studies
Chen, T.Y., Cheng, Y.C., Huang, S.J. et al. (2017) Does task-oriented virtual reality training on chronic stroke patients decrease the resources utilization of physical therapy in Taiwan?. International Journal of Stroke 12(3supplement1): 50-51	- Conference abstract

Study	Code [Reason]
Chen, Xinming, Liu, Fang, Lin, Shaohong et al. (2022) Effects of Virtual Reality Rehabilitation Training on Cognitive Function and Activities of Daily Living of Patients With Poststroke Cognitive Impairment: A Systematic Review and Meta-Analysis. Archives of physical medicine and rehabilitation 103(7): 1422-1435	- Study does not contain an intervention relevant to this review protocol *Virtual reality but not specific to telerehabilitation*
Chen, Yu, Abel, Kingsley Travis, Janecek, John T et al. (2019) Home-based technologies for stroke rehabilitation: A systematic review. International journal of medical informatics 123: 11-22	- Systematic review used as source of primary studies
Cherney, Leora R, Lee, Jaime B, Kim, Kwang-Youn A et al. (2021) Web-based Oral Reading for Language in Aphasia (Web ORLA R): A pilot randomized control trial. Clinical rehabilitation 35(7): 976-987	- No relevant outcomes reported
Chinthammit, Winyu, Merritt, Troy, Pedersen, Scott et al. (2014) Ghostman: augmented reality application for telerehabilitation and remote instruction of a novel motor skill. BioMed research international 2014: 646347	- No relevant outcomes reported
Cho, H.-Y., Song, E., Moon, J.-H. et al. (2021) Effects of virtual reality based therapeutic exercise on the upper extremity function and activities of daily living in patients with acute stroke: A pilot randomized controlled trial. Medico-Legal Update 21(2): 676-682	- Study does not contain an intervention relevant to this review protocol *Virtual reality intervention performed in hospital with a therapist present for the intervention (therefore not telerehabilitation)*
Cho, Ki Hun, Kim, Min Kyu, Lee, Hwang-Jae et al. (2015) Virtual Reality Training with Cognitive Load Improves Walking Function in Chronic Stroke Patients. The Tohoku journal of experimental medicine 236(4): 273-80	- Population not relevant to this review protocol
Cho, Ki Hun; Lee, Kyoung Jin; Song, Chang Ho (2012) Virtual-reality balance training with a video-game system improves dynamic balance in chronic stroke patients. The Tohoku journal of experimental medicine 228(1): 69-74	- Study does not contain an intervention relevant to this review protocol *Virtual reality therapy delivered in hospital by a therapist who was present for the whole intervention (therefore, not telerehabilitation)*
Cho, Ki Hun and Lee, Wan Hee (2014) Effect of treadmill training based real-world video recording on balance and gait in chronic stroke patients: a randomized controlled trial. Gait & posture 39(1): 523-8	- Study does not contain an intervention relevant to this review protocol *Virtual reality treadmill training completed in hospital (therefore not telerehabilitation)*

Study	Code [Reason]
Cho, Ki Hun and Lee, Wan Hee (2013) Virtual walking training program using a real-world video recording for patients with chronic stroke: a pilot study. American journal of physical medicine & rehabilitation 92(5): 371-458	- Study does not contain an intervention relevant to this review protocol *Technology approach completed in hospital rather than over distance therefore not being a form of telerehabilitation*
Choi, Yoon-Hee, Ku, Jeonghun, Lim, Hyunmi et al. (2016) Mobile game-based virtual reality rehabilitation program for upper limb dysfunction after ischemic stroke. Restorative neurology and neuroscience 34(3): 455-63	- Data not reported in an extractable format or a format that can be analysed *Outcomes reported in graphs as means without standard deviations or methods of calculating standard deviations or equivalents for summary statistics*
Choi, Yoon-Hee and Paik, Nam-Jong (2018) Mobile Game-based Virtual Reality Program for Upper Extremity Stroke Rehabilitation. Journal of visualized experiments : JoVE	- Study design not relevant to this review protocol *Quasi randomised and sufficient randomised controlled trials included.*
Choudhury, S, Singh, R, Shobhana, A et al. (2020) A novel wearable device for motor recovery of hand function in chronic stroke survivors. Neurorehabilitation and Neural Repair 34(7): 600-8	- Data not reported in an extractable format or a format that can be analysed *Reports data as medians and interquartile range only*
Chumbler, N.R., Roudebush, R.L., Morey, M.C. et al. (2011) The effects of a stroke telerehabilitation in-home intervention on function and disability: Preliminary results of a randomized clinical trial. Stroke 42(3): e76-e77	- Study design not relevant to this review protocol
Chumbler, Neale R, Li, Xinli, Quigley, Patricia et al. (2015) A randomized controlled trial on Stroke telerehabilitation: The effects on falls self-efficacy and satisfaction with care. Journal of telemedicine and telecare 21(3): 139-43	- Secondary publication of an included study that does not provide any additional relevant information
Chumbler, Neale R, Quigley, Patricia, Sanford, Jon et al. (2010) Implementing telerehabilitation research for stroke rehabilitation with community dwelling veterans: lessons learned. International journal of telerehabilitation 2(1): 15-22	- Study design not relevant to this review protocol
Chun, H.Y.Y., Carson, A., Tsanas, T. et al. (2019) Treating anxiety after stroke (TASK): Proof-of-concept of telemedicine cognitive behavioural therapy (TASKCBT) in a streamlined randomised controlled trial. European Stroke Journal 4(supplement1): 59	- Conference abstract

Study	Code [Reason]
Chun, H.Y.Y., Carson, A.J., Dennis, M.S. et al. (2018) TASK (Treating Anxiety after StroKe)-development of a telemedicine intervention using a systematic, logical and evidence-based methodology. International Journal of Stroke 13(3supplement1): 64	- Conference abstract
Chun, Ho-Yan Yvonne, Carson, Alan J, Dennis, Martin S et al. (2018) Treating anxiety after stroke (TASK): the feasibility phase of a novel web-enabled randomised controlled trial. Pilot and feasibility studies 4: 139	- Study design not relevant to this review protocol *Protocol only*
Chun, Ho-Yan Yvonne, Carson, Alan J, Tsanas, Athanasios et al. (2020) Telemedicine Cognitive Behavioral Therapy for Anxiety After Stroke: Proof-of-Concept Randomized Controlled Trial. Stroke 51(8): 2297-2306	- No relevant outcomes reported
Chung, B.P.H., Chiang, W.K.H., Lau, H. et al. (2020) Pilot study on comparisons between the effectiveness of mobile video-guided and paper-based home exercise programs on improving exercise adherence, self-efficacy for exercise and functional outcomes of patients with stroke with 3-month follow-up: A single-blind randomized controlled trial. Hong Kong Physiotherapy Journal 40(1): 63-73	- Study does not contain an intervention relevant to this review protocol *Computer-assisted technology but not telerehabilitation as no use of technology to feed back information to the rehabilitation professional*
Cikajlo, I, Rudolf, M, Goljar, N et al. (2012) Telerehabilitation using virtual reality task can improve balance in patients with stroke. Disability and rehabilitation 34(1): 13-18	- Study design not relevant to this review protocol *Single armed trial*
Cikajlo, Imre, Rudolf, Marko, Mainetti, Renato et al. (2020) Multi-Exergames to Set Targets and Supplement the Intensified Conventional Balance Training in Patients With Stroke: A Randomized Pilot Trial. Frontiers in psychology 11: 572	- Study does not contain an intervention relevant to this review protocol *Intervention took place with therapist present*
Clark, PG, Dawson, SJ, Scheideman-Miller, C et al. (2002) TeleRehab: stroke teletherapy and management using two-way interactive video. Neurology Report 26(2): 87-93	- Study design not relevant to this review protocol *Case report*
Coias, A.R.; Lee, M.H.; Bernardino, A. (2022) A low-cost virtual coach for 2D video-based compensation assessment of upper extremity rehabilitation exercises. Journal of NeuroEngineering and Rehabilitation 19(1): 83	- Study design not relevant to this review protocol *Single arm study*
Connor, D.O., Stockley, R., Moss, S. et al. (2016) Using virtual reality for upper limb recovery post stroke: A pilot study. Cerebrovascular Diseases 41(suppl1): 49	- Conference abstract

Study	Code [Reason]
Conroy, SS (2016) Translating Intensive Arm Rehabilitation in Stroke to a Telerehabilitation Format (TeleBATRAC).	- Full text paper not available
Cramer, S., Lucy, D., Le, V. et al. (2018) Telerehabilitation in the home versus therapy in-clinic for patients with stroke. European Stroke Journal 3(1supplement1): 590-591	- Conference abstract
Cramer, Steven C, Dodakian, Lucy, Le, Vu et al. (2020) A Feasibility Study of Expanded Home-Based Telerehabilitation After Stroke. Frontiers in neurology 11: 611453	- Study design not relevant to this review protocol
Crotty, M, Killington, M, van den Berg, M et al. (2014) Telerehabilitation for older people using off-the-shelf applications: Acceptability and feasibility. Journal of Telemedicine and Telecare 20(7): 370-6	- Population not relevant to this review protocol *Only 53% of people had a stroke*
da Silva Ribeiro, Nildo Manoel, Ferraz, Daniel Dominguez, Pedreira, Erika et al. (2015) Virtual rehabilitation via Nintendo Wii R and conventional physical therapy effectively treat post-stroke hemiparetic patients. Topics in stroke rehabilitation 22(4): 299-305	- Study does not contain an intervention relevant to this review protocol *Computer game supervised by a therapist for the whole procedure (therefore, not providing telerehabilitation as the therapist was present with the stroke survivor for the whole procedure)*
Darekar, A., McFadyen, B.J., Lamontagne, A. et al. (2015) Efficacy of virtual reality-based intervention on balance and mobility disorders post-stroke: A scoping review. Journal of NeuroEngineering and Rehabilitation 12(1): 35	- Systematic review used as source of primary studies
Dawson, D., Bar, Y., McEwen, S. et al. (2017) Enhancing participation in everyday life for people with stroke via telerehabilitation: A randomized controlled trial. International Journal of Stroke 12(4supplement1): 87-88	- Conference abstract
De Cock, E., Batens, K., Cocquyt, E.M. et al. (2019) The effect of a tablet-based aphasia therapy in the chronic phase after stroke. European Stroke Journal 4(supplement1): 808	- Conference abstract
De Cock, E., Batens, K., Feiken, J. et al. (2021) The feasibility, usability and acceptability of a tablet-based aphasia therapy in the acute phase following stroke. Journal of Communication Disorders 89: 106070	- Study design not relevant to this review protocol

Study	Code [Reason]
De La Torre Costa, J., Maier, M., Rubio Ballester, B. et al. (2021) A combination of computer-based and wearable systems to remotely promote and monitor recovery and arm use post-stroke: Preliminary results of a randomised controlled trial. European Stroke Journal 6(1suppl): 303	- Conference abstract
De Luca, R., Leonardi, S., Maresca, G. et al. (2021) Virtual reality as a new tool for the rehabilitation of post-stroke patients with chronic aphasia: an exploratory study. Aphasiology	- Study does not contain an intervention relevant to this review protocol *Virtual reality therapy provided with the therapist in the room guiding the intervention the whole time (therefore not being telerehabilitation)*
De Luca, Rosaria, Aragona, Bianca, Leonardi, Simona et al. (2018) Computerized Training in Poststroke Aphasia: What About the Long-Term Effects? A Randomized Clinical Trial. Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association 27(8): 2271-2276	- Study does not contain an intervention relevant to this review protocol *Computer-based speech and language therapy where a therapist is present the whole time, therefore is not delivered over a distance and so is not telerehabilitation*
De Paula Oliveira, T., Souza Miranda, C., Silva D'Alencar, M. et al. (2017) Balance training in virtual reality promotes superior generalization of gains in postural control to functionality in comparison conventional training-a randomized clinical trial. Cerebrovascular Diseases 43(supplement1): 57	- Full text paper not available
De Paula Oliveira, T., Souza Miranda, C., Xavier Muzzi De Gouvea, J. et al. (2016) Extensive training in virtual reality promotes an increase in the body function and activity, but not in participation domain according to 1CF: A randomized controlled trial. Cerebrovascular Diseases 41(suppl1): 309	- No relevant outcomes reported *No protocol outcomes reported (only health behaviour scores and the modified Rankin scale were reported)*
de Rooij, Ilona J M; van de Port, Ingrid G L; Meijer, Jan-Willem G (2016) Effect of Virtual Reality Training on Balance and Gait Ability in Patients With Stroke: Systematic Review and Meta-Analysis. Physical therapy 96(12): 1905-1918	- Systematic review used as source of primary studies
de Rooij, Ilona J M, van de Port, Ingrid G L, Punt, Michiel et al. (2021) Effect of Virtual Reality Gait Training on Participation in Survivors of Subacute Stroke: A Randomized Controlled Trial. Physical therapy 101(5)	- Study does not contain an intervention relevant to this review protocol *Therapy was supervised*
Deepa, S. and Kumari, P. (2020) Neurorehabilitation and technology - A systematic review and meta-	- Population not relevant to this review protocol

Study	Code [Reason]
analysis. International Journal of Research in Pharmaceutical Sciences 11(specialissue4): 1758-1765	*Not specific to people after stroke*
Demaerschalk, B.M. and Bobrow, B.J. (2009) Stroke team remote evaluation using a digital observation camera (Stroke DOC) randomized, blinded, prospective trial in arizona: The initial mayo Clinic experience (Time). Cerebrovascular Diseases 27(suppl6): 148	- Study design not relevant to this review protocol
Demaerschalk, B.M., Raman, R., Ernstrom, K. et al. (2010) Efficacy of site independent telemedicine: Pooled analysis of the STRokE DOC and STRokE DOC-AZ telemedicine stroke trials. Stroke 41(4): e246	- Conference abstract
Demaerschalk, Bart M., Switzer, Jeffrey A., Jipan, Xie et al. (2013) Cost Utility of Hub-and-Spoke Telestroke Networks From Societal Perspective. American Journal of Managed Care 19(12): 976-10	- Study design not relevant to this review protocol
Demaerschalk, Bart M, Aguilar, Maria I, Ingall, Timothy J et al. (2022) Stroke Telemedicine for Arizona Rural Residents, the Legacy Telestroke Study. Telemedicine reports 3(1): 67-78	- Study design not relevant to this review protocol
Demaerschalk, Bart M, Bobrow, Bentley J, Raman, Rema et al. (2010) Stroke team remote evaluation using a digital observation camera in Arizona: the initial mayo clinic experience trial. Stroke 41(6): 1251-8	- Study does not contain an intervention relevant to this review protocol *Assessment only intervention. Looking at thrombolysis decision making*
Demaerschalk, Bart M, Raman, Rema, Ernstrom, Karin et al. (2012) Efficacy of telemedicine for stroke: pooled analysis of the Stroke Team Remote Evaluation Using a Digital Observation Camera (STRokE DOC) and STRokE DOC Arizona telestroke trials. Telemedicine journal and e-health : the official journal of the American Telemedicine Association 18(3): 230-7	- Study does not contain an intervention relevant to this review protocol *Assessment only intervention. Looking at thrombolysis decision making*
Deng, Huiqiong, Durfee, William K, Nuckley, David J et al. (2012) Complex versus simple ankle movement training in stroke using telerehabilitation: a randomized controlled trial. Physical therapy 92(2): 197-209	- Comparator in study does not match that specified in this review protocol *Compares two types of telerehabilitation (one arm received tracking while the other doesn't - this study was included in the Cochrane review)*
Deutsch, JE; Lewis, JA; Burdea, G (2007) Reality-Integrated Telerehabilitation System: Technical and Patient Performance Using a Virtual Preliminary Finding. IEEE Transactions on Neural Systems and Rehabilitation Engineering 15(1): 30-5	- Study design not relevant to this review protocol *Single arm trial*

Study	Code [Reason]
Dodakian, Lucy, McKenzie, Alison L, Le, Vu et al. (2017) A Home-Based Telerehabilitation Program for Patients With Stroke. Neurorehabilitation and neural repair 31(1011): 923-933	- Study design not relevant to this review protocol
Doesborgh, S.J.C., van de Sandt-Koenderman, M.W.M.E., Dippel, D.W.J. et al. (2004) Cues on request: The efficacy of multicue, a computer program for wordfinding therapy. Aphasiology 18(3): 213-222	- Study does not contain an intervention relevant to this review protocol *Computer-based tool with no communication back to the rehabilitation professional (only feedback to the stroke survivor)*
Dominguez-Tellez, Pablo, Moral-Munoz, Jose A, Salazar, Alejandro et al. (2020) Game-Based Virtual Reality Interventions to Improve Upper Limb Motor Function and Quality of Life After Stroke: Systematic Review and Meta-analysis. Games for health journal 9(1): 1-10	- Systematic review used as source of primary studies
Donoso Brown, E.V., McCoy, S.W., Fechko, A.S. et al. (2014) Preliminary investigation of an electromyography-controlled video game as a home program for persons in the chronic phase of stroke recovery. Archives of Physical Medicine and Rehabilitation 95(8): 1461-1469	- Study design not relevant to this review protocol
Dorsch, A., Thomas, S., Xu, C. et al. (2014) Implementation of a multicenter, international, randomized clinical trial in subacute stroke patients using wireless health technology. Neurorehabilitation and Neural Repair 28(4): np17	- Conference abstract
Dorsch, A., Thomas, S., Xu, C. et al. (2013) Sirract: A multi-center, international, randomized clinical trial using wireless technology to affect outcomes during acute stroke rehabilitation. Neurology 80(1meetingabstracts)	- Conference abstract
Dorstyn, D S; Mathias, J L; Denson, L A (2011) Psychosocial outcomes of telephone-based counseling for adults with an acquired physical disability: A meta-analysis. Rehabilitation psychology 56(1): 1-14	- Population not relevant to this review protocol *People with conditions other than stroke in the majority of cases (one study includes people with stroke among other conditions with people with stroke not being a majority)*
Dowlatshahi, D., Mallet, K.H., Ramsay, T. et al. (2019) RecoverNow: A multicenter Phase II randomized controlled trial of early mobile tablet-based speech	- Conference abstract

Study	Code [Reason]
therapy for acute stroke patients with aphasia. International Journal of Stroke 14(3supplement): 28	
Duff, A., Duarte, E., Cuxart, A. et al. (2011) Rehabilitation Gaming System (RGS): The impact of virtual reality based training on upper limb recovery in the acute and chronic phase of stroke. Cerebrovascular Diseases 31(suppl2): 190	- Conference abstract
Eghdam, Aboozar, Scholl, Jeremiah, Bartfai, Aniko et al. (2012) Information and communication technology to support self-management of patients with mild acquired cognitive impairments: systematic review. Journal of medical Internet research 14(6): e159	- Systematic review used as source of primary studies
Ellis, Fiona, Kennedy, Niamh C, Hancock, Nicola J et al. (2021) Neurophysiological changes accompanying reduction in upper limb motor impairments in response to exercise-based virtual rehabilitation after stroke: systematic review. Physiotherapy 113: 141-152	- Systematic review used as source of primary studies
Emmerson, Kellie B; Harding, Katherine E; Taylor, Nicholas F (2017) Home exercise programmes supported by video and automated reminders compared with standard paper-based home exercise programmes in patients with stroke: a randomized controlled trial. Clinical rehabilitation 31(8): 1068-1077	- Study does not contain an intervention relevant to this review protocol *No two way communication - given home excises on tablet*
Emuk, Y.; Ozturk, V.; Sengul, Y. (2018) The effects of virtual reality systems on balance impairments in patients with chronic stroke: A single blinded randomized controlled study. European Stroke Journal 3(1supplement1): 597	- Conference abstract
English, C., Patterson, A., MacDonald-Wicks, L. et al. (2019) ENAbLE: Secondary prevention of stroke. A physical activity and diet trial protocol. International Journal of Stroke 14(1supplement): 12	- Conference abstract
English, Coralie, Ceravolo, Maria Gabriella, Dorsch, Simone et al. (2022) Telehealth for rehabilitation and recovery after stroke: State of the evidence and future directions. International journal of stroke : official journal of the International Stroke Society 17(5): 487-493	- Review article but not a systematic review
Escalante-Gonzalbo, Ana María, Ramírez-Graullera, Yoás Saimon, Pasantes, Herminia et al. (2021) Safety, Feasibility, and Acceptability of a New Virtual Rehabilitation Platform: A Supervised Pilot Study. Rehabilitation Process & Outcome: 1-13	- Study design not relevant to this review protocol

Study	Code [Reason]
Faeta, Julie; Tanksley, Heather; Page, Stephen (2016) Poststroke Reductions in Impairment and Functional Limitation Using a FaceTime- Based Upper-Extremity Protocol. American Journal of Occupational Therapy 70: 1-1	- Conference abstract
Faheem, Filzah, Zafar, Zaitoon, Razzak, Aisha et al. (2022) Implementing Virtual Care in Neurology - Challenges and Pitfalls. Journal of Central Nervous System Disease: 1-9	- Review article but not a systematic review
Faux, S (2017) A telehealth transfer package to improve post stroke rehabilitation outcomes.	- Full text paper not available
Fitzgerald, Susan (2011) Telemedicine for Stroke is Cost-Efficient Over the Long Haul. Neurology Today 11(19): 13-14	- Study design not relevant to this review protocol *Report only*
Flodgren, G, Rachas, A, Farmer, AJ et al. (2015) Interactive telemedicine: effects on professional practice and health care outcomes. Cochrane Database of Systematic Reviews	- Systematic review used as source of primary studies
Fluet, GG and Qui, Q (2019) Utilizing gaming mechanics to optimize telerehabilitation adherence in persons with stroke.	- Full text paper not available
Forducey, Pamela G, Glueckauf, Robert L, Bergquist, Thomas F et al. (2012) Telehealth for persons with severe functional disabilities and their caregivers: facilitating self-care management in the home setting. Psychological services 9(2): 144-62	- No relevant outcomes reported
Gaboury, Isabelle, Tousignant, Michel, Corriveau, Helene et al. (2021) Effects of Telerehabilitation on Patient Adherence to a Rehabilitation Plan: Protocol for a Mixed Methods Trial. JMIR research protocols 10(10): e32134	- Study design not relevant to this review protocol *Protocol only*
Gamito, Pedro, Oliveira, Jorge, Coelho, Carla et al. (2017) Cognitive training on stroke patients via virtual reality-based serious games. Disability and rehabilitation 39(4): 385-388	- Study does not contain an intervention relevant to this review protocol *Virtual reality therapy provided to inpatients (not providing rehabilitation over a distance)*
Gao, L., Tan, E., Kim, J. et al. (2022) Telemedicine for Stroke: Quantifying the Long-Term National Costs and Health Benefits. Frontiers in Neurology 12: 804355	- Study design not relevant to this review protocol

Study	Code [Reason]
Garcia, Andres, Mayans, Berta, Margeli, Carles et al. (2022) A feasibility study to assess the effectiveness of Muvity: A telerehabilitation system for chronic post-stroke subjects. Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association 31(11): 106791	- No relevant outcomes reported
Garcia-Esperon, Carlos, Soderhjelm Dinkelspiel, Frode, Miteff, Ferdi et al. (2020) Implementation of multimodal computed tomography in a telestroke network: Five-year experience. CNS neuroscience & therapeutics 26(3): 367-373	- Study design not relevant to this review protocol
Garcia-Esperon, Carlos, Chew, Beng Lim Alvin, Minett, Fiona et al. (2022) Impact of an outpatient telestroke clinic on management of rural stroke patients. Australian Journal of Rural Health 30(3): 337-342	- Study design not relevant to this review protocol *Single-arm trial*
Garzon, J., Freire, I., Diaz, A. et al. (2022) TELEMEDICINE EFFICACY IN MEDICATION ADHERENCE IN POST-ISCHEMIC STROKE PATIENTS: ONGOING CLINICAL TRIAL. European Stroke Journal 7(1suppl): 150	- Conference abstract
Georgeadis, A.C., Brennan, D.M., Barker, L.M. et al. (2004) Telerehabilitation and its effect on story retelling by adults with neurogenic communications disorders. Aphasiology 18(57): 639-652	- Population not relevant to this review protocol *>20% had traumatic brain injury rather than a stroke*
Giachero, A, Calati, M, Pia, L et al. (2020) Conversational Therapy through Semi-Immersive Virtual Reality Environments for Language Recovery and Psychological Well-Being in Post Stroke Aphasia. Behavioural neurology 2020: 2846046	- Study does not contain an intervention relevant to this review protocol *Therapist present throughout*
Gibson, Jo, Fitzgerald, Jane, McAdam, Joanna et al. (2013) Using telemedicine for acute stroke assessment. Nursing Times 109(35): 14-16	- Review article but not a systematic review
Gil-Pages, Macarena, Solana, Javier, Sanchez-Carrion, Rocio et al. (2018) A customized home-based computerized cognitive rehabilitation platform for patients with chronic-stage stroke: study protocol for a randomized controlled trial. Trials 19(1): 191	- Study design not relevant to this review protocol
Gillham, Sarah and Endacott, Ruth (2010) Impact of enhanced secondary prevention on health behaviour in patients following minor stroke and transient ischaemic attack: a randomized controlled trial. Clinical rehabilitation 24(9): 822-30	- Population not relevant to this review protocol *Unclear how many people had a transient ischaemic attack*

Study	Code [Reason]
Gomez, V.M., Shoaib, M., Mahmoud, N. et al. (2022) The frontiers in stroke care: the disparities of telemedicine and telestroke in latin america. Stroke 53(suppl1)	- Conference abstract
Gong, Enying, Gu, Wanbing, Sun, Cheng et al. (2019) System-integrated technology-enabled model of care to improve the health of stroke patients in rural China: protocol for SINEMA-a cluster-randomized controlled trial. American heart journal 207: 27-39	- Study design not relevant to this review protocol *Protocol only*
Gong, Enying, Sun, Lixin, Long, Qian et al. (2021) The Implementation of a Primary Care-Based Integrated Mobile Health Intervention for Stroke Management in Rural China: Mixed-Methods Process Evaluation. Frontiers in public health 9: 774907	- Study design not relevant to this review protocol *Single arm quantitative data*
Goudarzian, M (2018) The effect of tele-nursing through telephone counselling practices on depression and anxiety in informal caregivers of stroke survivors in Sabzevar.	- Study design not relevant to this review protocol
Goudarzian, Maryam, Fallahi-Khoshknab, Masoud, Dalvandi, Asghar et al. (2018) Effect of Telenursing on Levels of Depression and Anxiety in Caregivers of Patients with Stroke: A Randomized Clinical Trial. Iranian journal of nursing and midwifery research 23(4): 248-252	- Population not relevant to this review protocol
Gough, N., Brkan, L., Subramaniam, P. et al. (2020) Feasibility of remotely supervised transcranial direct current stimulation and cognitive remediation: A systematic review. PLoS ONE 15(2): e0223029	- Systematic review used as source of primary studies
Govercin, M., Missala, I.M., Marschollek, M. et al. (2010) Virtual rehabilitation and telerehabilitation for the upper limb: A geriatric review. GeroPsych: The Journal of Gerontopsychology and Geriatric Psychiatry 23(2): 79-90	- Systematic review used as source of primary studies
Gracey, F., Wilson, B.A., Manly, T. et al. (2012) The effectiveness of brief goal management training (GMT) and sms text alerts on psychosocial functioning following brain injury: The assisted intention monitoring (AIM) trial?. Brain Impairment 13(1): 180-181	- Conference abstract
Grant, Joan S, Elliott, Timothy R, Weaver, Michael et al. (2002) Telephone intervention with family caregivers of stroke survivors after rehabilitation. Stroke 33(8): 2060-5	- No relevant outcomes reported

Study	Code [Reason]
Graven, Lucinda J, Glueckauf, Robert L, Regal, Rachel A et al. (2021) Telehealth Interventions for Family Caregivers of Persons with Chronic Health Conditions: A Systematic Review of Randomized Controlled Trials. International journal of telemedicine and applications 2021: 3518050	- Systematic review used as source of primary studies
Guillaumier, Ashleigh, McCrabb, Sam, Spratt, Neil J et al. (2019) An online intervention for improving stroke survivors' health-related quality of life: study protocol for a randomised controlled trial. Trials 20(1): 491	- Study design not relevant to this review protocol
Guillaumier, Ashleigh, Spratt, Neil J, Pollack, Michael et al. (2022) Evaluation of an online intervention for improving stroke survivors' health-related quality of life: A randomised controlled trial. PLoS medicine 19(4): e1003966	- Population not relevant to this review protocol *>20% of participants had a transient ischaemic attack*
Guo, Yiting Emily, Togher, Leanne, Power, Emma et al. (2017) Assessment of Aphasia Across the International Classification of Functioning, Disability and Health Using an iPad-Based Application. Telemedicine journal and e-health : the official journal of the American Telemedicine Association 23(4): 313-326	- Study does not contain an intervention relevant to this review protocol *Investigates the use of telerehabilitation for assessment of aphasia rather that using telerehabilitation as an intervention (not included in the protocol for this review)*
Gustafsson, L., Cornwell, P., Kuys, S. et al. (2020) Effectiveness of atelehealth self-management program for people with mild stroke: Results of a randomised controlled trial with longitudinal follow-up. International Journal of Stroke 15(1suppl): 159	- Conference abstract
Halbert, Kelsey and Bautista, Cynthia (2019) Telehealth Use to Promote Quality Outcomes and Reduce Costs in Stroke Care. Critical Care Nursing Clinics of North America 31(2): 133-139	- Review article but not a systematic review
Hall, William J. (2012) 2012 - Telemonitoring did not reduce hospitalizations or ED visits in high-risk elderly patients. ACP Journal Club 157(6): 1-1	- Study design not relevant to this review protocol *Commentary only*
Hamel, Renee (2018) Review of ViaTherapy Mobile Application for Upper Extremity Stroke Rehabilitation. Physical Therapy Reviews 23(45): 298-299	- Study design not relevant to this review protocol *Report only*
Handschu, R, Scibor, M, NuckeLM et al. (2005) Telemedicine in acute stroke: remote video-examination vs telephone based consultation in acute stroke care - first experience from the STENO-Project.	- Full text paper not available

Study	Code [Reason]
Cerebrovascular diseases (Basel, Switzerland) 19suppl2: 59	
Handschu, R, Scibor, M, Willaczeck, B et al. (2008) Telemedicine for stroke management - costs of service in different organisational models. Cerebrovascular diseases (Basel, Switzerland) 25(suppl2): 188	- Conference abstract
Handschu, Rene, Scibor, Mateusz, Wacker, Angela et al. (2014) Feasibility of certified quality management in a comprehensive stroke care network using telemedicine: STENO project. International journal of stroke : official journal of the International Stroke Society 9(8): 1011-6	- Study design not relevant to this review protocol
Harrison, Madeleine; Palmer, Rebecca; Cooper, Cindy (2020) Factors Associated With Adherence to Self-Managed Aphasia Therapy Practice on a Computer-A Mixed Methods Study Alongside a Randomized Controlled Trial. Frontiers in neurology 11: 582328	- No relevant outcomes reported
Harvey, S.; Baird, A.; Meltzer, J.A. (2015) Evaluation of TeleRehab effectiveness for post-stroke communication disorders. International Journal of Stroke 10(suppl4): 83	- Conference abstract
Hemphill, Sydney, Rodriguez, Samuel, Wang, Ellen et al. (2022) Virtual Reality Augments Movement During Physical Therapy: A Pragmatic Randomized Trial. American journal of physical medicine & rehabilitation 101(3): 229-236	- Population not relevant to this review protocol *Includes adults and children with a range of indications (injury, postoperative, chronic pain and pre-existing conditions)*
Hermens, Hermie, Huijgen, Barbara, Giacomozzi, Claudia et al. (2008) Clinical assessment of the HELLODOC tele-rehabilitation service. Annali dell'Istituto superiore di sanita 44(2): 154-63	- Population not relevant to this review protocol *Only 20% of people had a stroke*
Hernandez, A., Kairy, D., Higgins, J. et al. (2019) Maximizing upper-limb rehabilitation for chronic post-stroke patients using a remotely monitored virtual reality exergame: Preliminary results of a randomized clinical trial. International Journal of Stroke 14(3supplement): 39	- Conference abstract
Hernandez, Alejandro, Bubyr, Liudmila, Archambault, Philippe S et al. (2022) Virtual Reality-Based Rehabilitation as a Feasible and Engaging Tool for the Management of Chronic Poststroke Upper-Extremity Function Recovery: Randomized Controlled Trial. JMIR serious games 10(3): e37506	- No relevant outcomes reported

Study	Code [Reason]
Heron, N., O'connor, S.R., Kee, F. et al. (2021) Development of a digital lifestyle modification intervention for use after transient ischaemic attack or minor stroke: A person-based approach. International Journal of Environmental Research and Public Health 18(9): 4861	- Study design not relevant to this review protocol
Heron, Neil, Kee, Frank, Mant, Jonathan et al. (2019) Rehabilitation of patients after transient ischaemic attack or minor stroke: pilot feasibility randomised trial of a home-based prevention programme. The British journal of general practice : the journal of the Royal College of General Practitioners 69(687): e706-e714	- No relevant outcomes reported
Hewitt, Jonathan, Pennington, Anna, Smith, Alexander et al. (2019) A multi-centre, UK-based, non-inferiority randomised controlled trial of 4 follow-up assessment methods in stroke survivors. BMC medicine 17(1): 111	- Study does not contain an intervention relevant to this review protocol *Looking at assessment only*
HISCOTT, REBECCA (2015) Stroke: Low-Cost Mobile Telestroke System Found Reliable for Pre-Hospital Assessment. Neurology Today 15(9): 1-16	- Study design not relevant to this review protocol *Report only*
Ho, H.J., Wu, E.H.-K., Lee, S.-F. et al. (2020) Stroke patient accepted mobile rehabilitation system of improvement outcome based on unified theory of acceptance & use of technology-a randomized controlled trial. International Journal of Stroke 15(1suppl): 390-391	- Conference abstract
Ho, H.J., Wu, E.H.-K., Lee, S.-F. et al. (2020) Improving outcome of acute stroke patients by a mobile assistive rehabilitation system-a stroke center experience. International Journal of Stroke 15(1suppl): 256	- Conference abstract
Ho, Hsiu-Yu, Chen, Ming-De, Tsai, Chiu-Chin et al. (2022) Effects of computerized cognitive training on cognitive function, activity, and participation in individuals with stroke: A randomized controlled trial. NeuroRehabilitation 51(1): 79-89	- Study does not contain an intervention relevant to this review protocol *Computer-based therapy but delivered with an occupational therapist present (therefore not telerehabilitation)*
Hoffmann, Tammy, McKenna, Kryss, Worrall, Linda et al. (2007) Randomised trial of a computer-generated tailored written education package for patients following stroke. Age and ageing 36(3): 280-6	- Study does not contain an intervention relevant to this review protocol *No communcation channel or feedback from patient*
Hoffmann, Tammy, Worrall, Linda, Eames, Sally et al. (2010) Measuring outcomes in people who have had a	- Study does not contain an intervention relevant to this review protocol

Study	Code [Reason]
stroke and their carers: can the telephone be used?. Topics in stroke rehabilitation 17(2): 119-27	*Looking at assessment of stroke outcomes only*
Holden, MK, Dyar, T, Schwamm, L et al. (2002) Telerehabilitation: development and initial testing of a remotely operated computerized motor training system to provide patients with home-based therapy via the Internet...Platform & poster presentations for CSM 2003. Neurology Report 26(4): 198-198	- Conference abstract
Holden, MK; Dyar, TA; Dayan-Cimadoro, L (2007) Telerehabilitation Using a Virtual Environment Improves Upper Extremity Function in Patients With Stroke. IEEE Transactions on Neural Systems and Rehabilitation Engineering 15(1): 36-42	- Study design not relevant to this review protocol *Single arm trial*
Hosseini, A., Sharifi, N., Dehghanrad, F. et al. (2022) Effect of Telenursing on Caregiver Burden of Care and Incidence of some Complications in Patients with Acute Stroke Discharged from Neurological Wards: A Randomized Control Trial. Shiraz E Medical Journal 23(8): e123479	- No relevant outcomes reported
Hosseiniravandi, M., Kahlaee, A.H., Karim, H. et al. (2020) Home-based telerehabilitation software systems for remote supervising: A systematic review. International Journal of Technology Assessment in Health Care 36(2): 113-125	- Systematic review used as source of primary studies
Hsiao, C.-C., Tsai, J.-P., Sung, K.-T. et al. (2017) Telemedicine in cardiovascular disease. Journal of Internal Medicine of Taiwan 28(3): 133-139	- Review article but not a systematic review
Hubert, Gordian J.; Corea, Francesco; Schlachetzki, Felix (2021) The role of telemedicine in acute stroke treatment in times of pandemic. Current Opinion in Neurology 34(1): 22-26	- Review article but not a systematic review
Hubert, Gordian J; Muller-Barna, Peter; Audebert, Heinrich J (2014) Recent advances in TeleStroke: a systematic review on applications in prehospital management and Stroke Unit treatment or TeleStroke networking in developing countries. International journal of stroke : official journal of the International Stroke Society 9(8): 968-73	- Study does not contain an intervention relevant to this review protocol *Prehospital management and stroke unit treatment, or telestroke networking in developing countries*
Hudson, L., Corrales, M., Moreno, L. et al. (2015) Cares (changing and advancing risk factor control through educations after stroke): A pilot trial of a transitions in care post-discharge telephone intervention for stroke patients. Neurology 84(suppl14)	- Conference abstract

Study	Code [Reason]
Huijbregts, M.P., Cameron, J., Taylor, D. et al. (2010) Videoconference delivery of a stroke self-management program: A mixed methods waiting list randomized controlled trial. Stroke 41(4): e357	- Conference abstract
Huijbregts, M, Taylor, D, Cameron, J et al. (2007) Telehealth delivery of most, a stroke selfmanagement program to remote areas in northern Ontario: results of the pilot evaluation. Physiotherapy 93(suppl1): 543	- Conference abstract
Huijbregts, Maria P J; McEwen, Sara; Taylor, Denise (2009) Exploring the feasibility and efficacy of a telehealth stroke self-management programme: a pilot study. Physiotherapy Canada. Physiotherapie Canada 61(4): 210-20	- Study design not relevant to this review protocol *Non-randomised study when there is sufficient randomised evidence for the review*
Hung KN, G. and Fong, K.N.K. (2019) Effects of telerehabilitation in occupational therapy practice: A systematic review. Hong Kong Journal of Occupational Therapy 32(1): 3-21	- Systematic review used as source of primary studies
Hung, N.-T., Paul, V., Kovach, T. et al. (2021) Wearable myoelectric interface training for improving arm movement in chronic stroke. Stroke 52(suppl1)	- Conference abstract
Hwang, Na-Kyoung; Park, Ji-Su; Chang, Moon-Young (2021) Telehealth Interventions to Support Self-Management in Stroke Survivors: A Systematic Review. Healthcare (Basel, Switzerland) 9(4)	- Systematic review used as source of primary studies
HÃ¶hlig, J., Czekanska, A., HÃ¶hlig, C. et al. (2013) LB016-SUN TELEDYSPHAGIA FOR ACUTE STROKE PATIENTS USING A STANDARDIZED EXAMINATION KIT IN A TELESTROKE NETWORK. Clinical Nutrition 32: 229-s229	- Study design not relevant to this review protocol *Report only*
Irewall, A.L., Johansson, C., Stromvall, A. et al. (2014) Preventive stroke strategies nurse-led, telephone-based secondary preventive intervention after stroke or tia improves blood pressure after 12 months of follow-up. International Journal of Stroke 9(suppl3): 278-279	- Conference abstract
Irewall, Anna-Lotta, Ogren, Joachim, Bergstrom, Lisa et al. (2019) Nurse-led, telephone-based secondary preventive follow-up benefits stroke/TIA patients with low education: a randomized controlled trial sub-study. Trials 20(1): 52	- No relevant outcomes reported
Irewall, Anna-Lotta, Ulvenstam, Anders, Graipe, Anna et al. (2021) Nurse-based secondary preventive follow-	- Study does not contain an intervention relevant to this review protocol

Study	Code [Reason]
up by telephone reduced recurrence of cardiovascular events: a randomised controlled trial. Scientific reports 11(1): 15628	*No therapy provided and intervention examines secondary preventative advice follow up calls only*
Isernia, S., Pagliari, C., Jonsdottir, J. et al. (2019) Efficiency and Patient-Reported Outcome Measures From Clinic to Home: The Human Empowerment Aging and Disability Program for Digital-Health Rehabilitation. Frontiers in Neurology 10: 1206	- Study design not relevant to this review protocol
Jackson, D, Elsom, S, Joubert, L et al. (2010) An exploration of the role of the nursing coordinator in a telemedicine based stroke secondary prevention model. International journal of stroke 5(1): 1	- Conference abstract
Jacobs, M. and Ellis, C. (2021) Estimating the cost and value of functional changes in communication ability following telepractice treatment for aphasia. PLoS ONE 16(9september): e0257462	- No relevant outcomes reported
Jagos, Harald, David, Veronika, Haller, Michael et al. (2015) A Framework for (Tele-) Monitoring of Rehabilitation Progress in Stroke Patients. Studies in Health Technology & Informatics 212: 243-243	- Review article but not a systematic review
Jagos, Harald, David, Veronika, Reichel, Martin et al. (2015) Tele-Monitoring of the Rehabilitation Progress in Stroke Patients. Studies in Health Technology & Informatics 211: 311-313	- Study design not relevant to this review protocol *Report only - insufficient information about the methods and the results*
Jakobsson, Stina, Huber, Daniel, Bjorklund, Fredrik et al. (2016) Implementation of a new guideline in cardiovascular secondary preventive care: subanalysis of a randomized controlled trial. BMC cardiovascular disorders 16: 77	- Population not relevant to this review protocol
Janssen, Frank, Awadallah, Mohammed, Alhalabi, Awed et al. (2018) Telemedicine in general neurology: use of audiovisual consultation for on call back-up service in an acute care hospital. Journal of neurology 265(4): 880-884	- Population not relevant to this review protocol *Not specific to stroke (relates to lots of conditions in a neurology service)*
Jarbandhan, Ameerani, Toelsie, Jerry, Veeger, DirkJan et al. (2022) Feasibility of a home-based physiotherapy intervention to promote post-stroke mobility: A randomized controlled pilot study. PloS one 17(3): e0256455	- Study does not contain an intervention relevant to this review protocol *Supervised home exercise program followed up by a telerehabilitation home exercise program, compared to a usual care that is not matched for treatment time and therefore is difficult to compare to*

Study	Code [Reason]
Jayabalan, P., Kaplan, R., Breisinger, T. et al. (2014) Video recording the gait of stroke patients during inpatient rehabilitation to improve motivation, satisfaction and outcome. PM and R 6(9suppl1): 170	- Conference abstract
Jhaveri, D.; Larkins, S.; Sabesan (2015) A systematic review to analyse the outcomes of active medical therapies delivered with telemedicine support to rural and remote populations. Internal Medicine Journal 45(supplement3): 12-13	- Conference abstract
Jhaveri, Divita; Larkins, Sarah; Sabesan, Sabe (2015) Telestroke, tele-oncology and teledialysis: a systematic review to analyse the outcomes of active therapies delivered with telemedicine support. Journal of telemedicine and telecare 21(4): 181-8	- Systematic review used as source of primary studies
Jiang, Xinchan; Ming, Wai-Kit; You, Joyce Hs (2019) The Cost-Effectiveness of Digital Health Interventions on the Management of Cardiovascular Diseases: Systematic Review. Journal of medical Internet research 21(6): e13166	- Systematic review used as source of primary studies
Jin, W (2014) The Randomized Controlled Clinical Trial for Validity and Safety of Home Based Telerehabilitation in Ischemic Cerebral Stroke Disability Rehabilitation.	- Conference abstract
Jin, Wei, Chen, Jing, Shi, Fangfang et al. (2015) Home-based tele-supervising rehabilitation for brain infarction patients (HTRBIP): study protocol for a randomized controlled trial. Trials 16: 61	- Study design not relevant to this review protocol
Jiru-Hillmann, S., Kraft, P., Gabriel, K. et al. (2021) Improving secondary prevention by a dedicated telemedical consultation: The trans-regional telemedicine network for stroke intervention with telemedicine (transit-stroke). European Stroke Journal 6(1suppl): 194-195	- Conference abstract
Jiru-Hillmann, Steffi, Gabriel, Katharina M A, Schuler, Michael et al. (2022) Experiences of family caregivers 3-months after stroke: results of the prospective trans-regional network for stroke intervention with telemedicine registry (TRANSIT-Stroke). BMC geriatrics 22(1): 228	- Study design not relevant to this review protocol
Johansson, Tim and Wild, Claudia (2011) Telerehabilitation in stroke care--a systematic review. Journal of telemedicine and telecare 17(1): 1-6	- Systematic review used as source of primary studies

Study	Code [Reason]
Johansson, Tim and Wild, Claudia (2010) Telemedicine in acute stroke management: systematic review. International journal of technology assessment in health care 26(2): 149-55	- Study not reported in English
Johnson, Liam, Bird, Marie-Louise, Muthalib, Makii et al. (2020) An Innovative STRoke Interactive Virtual thErapy (STRIVE) Online Platform for Community-Dwelling Stroke Survivors: A Randomized Controlled Trial. Archives of physical medicine and rehabilitation 101(7): 1131-1137	- Study does not contain an intervention relevant to this review protocol *Virtual reality therapy delivered by an in-person therapy*
Johnston, B, Wheeler, L, Deuser, J et al. (2000) Outcomes of the Kaiser Permanente Tele-Home Health Research Project. Archives of family medicine 9(1): 40-5	- Population not relevant to this review protocol *Only 6% of people had a stroke*
Joosup, Kim, Tan, Elise, Lan, Gao et al. (2022) Cost-effectiveness of the Victorian Stroke Telemedicine program. Australian Health Review 46(3): 294-301	- No relevant outcomes reported
Joubert, J., Christie, A., Laing, J. et al. (2013) Telestroke: Long-term risk factor management - Part II. European Research in Telemedicine 2(2): 57-67	- Review article but not a systematic review
Joubert, J, Joubert, LB, Medeiros de Bustos, E et al. (2009) Telestroke in Stroke Survivors. Cerebrovascular diseases (Basel, Switzerland) 27(suppl4): 28-35	- Review article but not a systematic review
Julia, P.E., Shahizan, M.R., Mazlina, M. et al. (2012) Delivering therapy at home: A preliminary result. Neurorehabilitation and Neural Repair 26(6): 715	- Conference abstract
Kaambwa, B., Bryan, S., Jowett, S. et al. (2014) Telemonitoring and self-management in the control of hypertension (TASMINH2): A cost-effectiveness analysis. European Journal of Preventive Cardiology 21(12): 1517-1530	- Population not relevant to this review protocol
Kairy, D (2018) Optimizing a home-based virtual reality exercise program for chronic stroke patients: a telerehabilitation approach.	- Full text paper not available *Clinical trial record*
Kairy, D (2015) Post-stroke upper limb rehabilitation using telerehabilitation interactive virtual reality system in the patient's home.	- Full text paper not available *Clinical trial record*
Kamal, Ayeesha, Khoja, Adeel, Usmani, Bushra et al. (2020) Effect of 5-Minute Movies Shown via a Mobile Phone App on Risk Factors and Mortality After Stroke	- Study does not contain an intervention relevant to this review protocol

Study	Code [Reason]
in a Low- to Middle-Income Country: Randomized Controlled Trial for the Stroke Caregiver Dyad Education Intervention (Movies4Stroke). JMIR mHealth and uHealth 8(1): e12113	*Only one way communication. No way for participants to feed back to professional*
Kamoen, Olivia, Maqueda, V, Yperzeele, L et al. (2020) Stroke coach: a pilot study of a personal digital coaching program for patients after ischemic stroke. Acta neurologica Belgica 120(1): 91-97	- Study design not relevant to this review protocol
Kamwesiga, Julius T, Eriksson, Gunilla M, Tham, Kerstin et al. (2018) A feasibility study of a mobile phone supported family-centred ADL intervention, F@ce TM, after stroke in Uganda. Globalization and health 14(1): 82	- Study design not relevant to this review protocol
Kang, Yi-No, Shen, Hsiu-Nien, Lin, Chia-Yun et al. (2019) Does a Mobile app improve patients' knowledge of stroke risk factors and health-related quality of life in patients with stroke? A randomized controlled trial. BMC medical informatics and decision making 19(1): 282	- Study does not contain an intervention relevant to this review protocol *Only one way communication. No way for participants to feed back to the professional*
Kilbride, C., Warland, A., Norris, M. et al. (2018) RHOMBUS: Rehabilitation via HOMe Based gaming exercise for the Upper limb post-stroke. International Journal of Stroke 13(3supplement1): 28	- Conference abstract
Kilbride, Cherry, Warland, Alyson, Stewart, Victoria et al. (2022) Rehabilitation using virtual gaming for Hospital and hOMe-Based training for the Upper limb post Stroke (RHOMBUS II): protocol of a feasibility randomised controlled trial. BMJ open 12(6): e058905	- Study design not relevant to this review protocol
Kim, Esther S, Laird, Laura, Wilson, Carlee et al. (2021) Implementation and Effects of an Information Technology-Based Intervention to Support Speech and Language Therapy Among Stroke Patients With Aphasia: Protocol for a Virtual Randomized Controlled Trial. JMIR research protocols 10(7): e30621	- Study design not relevant to this review protocol
Kinast, B.; Lutz, M.; Schreiweis, B. (2021) Telemonitoring of real-world health data in cardiology: A systematic review. International Journal of Environmental Research and Public Health 18(17): 9070	- Population not relevant to this review protocol
Kirkness, C.J., Becker, K.J., Cain, K.C. et al. (2015) Telephone versus in-person psychosocial behavioral treatment in post-stroke depression. Stroke 46(suppl1)	- Conference abstract

Study	Code [Reason]
Knepley, Kurt D, Mao, Jennifer Z, Wieczorek, Peter et al. (2021) Impact of Telerehabilitation for Stroke-Related Deficits. Telemedicine journal and e-health : the official journal of the American Telemedicine Association 27(3): 239-246	- Systematic review used as source of primary studies
Koh, Gerald Choon-Huat, Yen, Shih Cheng, Tay, Arthur et al. (2015) Singapore Tele-technology Aided Rehabilitation in Stroke (STARS) trial: protocol of a randomized clinical trial on tele-rehabilitation for stroke patients. BMC neurology 15: 161	- Study design not relevant to this review protocol
Koh, Min Hyong, Yen, Sheng-Che, Leung, Lester Y et al. (2021) Exploiting telerobotics for sensorimotor rehabilitation: a locomotor embodiment. Journal of neuroengineering and rehabilitation 18(1): 66	- Study does not contain an intervention relevant to this review protocol *Intervention was delivered in person*
Krpic, Andrej; Savanovic, Arso; Cikajlo, Imre (2013) Telerehabilitation: remote multimedia-supported assistance and mobile monitoring of balance training outcomes can facilitate the clinical staff's effort. International Journal of Rehabilitation Research 36(2)	- Study does not contain an intervention relevant to this review protocol *VR balance telerehabilitation involves 2 weeks hospital based treatment with assistance from the physiotherapist prior to being home based and only 1 week of the intervention is home based*
Kulshrestha, S., Agrawal, M., Singh, A.K. et al. (2020) Post stroke rehabilitation using computer-based cognitive intervention (CBCI): A systematic review. Current Psychiatry Research and Reviews 16(2): 93-102	- Study does not contain an intervention relevant to this review protocol *Computer-based intervention, not specifically telerehabilitation*
Kuo, Li-Chieh, Yang, Kang-Chin, Lin, Yu-Ching et al. (2022) Internet of Things (IoT) Enables Robot-Assisted Therapy as a Home Program for Training Upper Limb Functions in Chronic Stroke: A Randomized Control Crossover Study. Archives of physical medicine and rehabilitation	- Comparator in study does not match that specified in this review protocol *Compares two home-based training programs (not a telerehabilitation program and an in person training program or usual care)*
Lansberg, Maarten G, Legault, Catherine, MacLellan, Adam et al. (2022) Home-based virtual reality therapy for hand recovery after stroke. PM & R : the journal of injury, function, and rehabilitation 14(3): 320-328	- Study design not relevant to this review protocol *Single arm trial*
Latimer, Nicholas R, Bhadhuri, Arjun, Alshreef, Abualbishr et al. (2021) Self-managed, computerised word finding therapy as an add-on to usual care for chronic aphasia post-stroke: An economic evaluation. Clinical rehabilitation 35(5): 703-717	- Study design not relevant to this review protocol

Study	Code [Reason]
Latimer, Nicholas R; Dixon, Simon; Palmer, Rebecca (2013) Cost-utility of self-managed computer therapy for people with aphasia. International journal of technology assessment in health care 29(4): 402-9	- Study design not relevant to this review protocol
Laver, K, George, S, Thomas, S et al. (2012) Cochrane review: virtual reality for stroke rehabilitation. European journal of physical and rehabilitation medicine 48(3): 523-30	- Study does not contain an intervention relevant to this review protocol *Discusses virtual reality, not explicitly telerehabilitation*
Laver, Kate; Walker, Marion; Ward, Nick (2022) Telerehabilitation for Stroke is Here to Stay. But at What Cost?. Neurorehabilitation and neural repair 36(6): 331-334	- Review article but not a systematic review
Lawson, David W, Stolwyk, Renerus J, Ponsford, Jennie L et al. (2020) Telehealth Delivery of Memory Rehabilitation Following Stroke. Journal of the International Neuropsychological Society : JINS 26(1): 58-71	- Study design not relevant to this review protocol *Non-randomised study when there is a sufficient amount of randomised evidence*
Lawson, Sonia; Ziying, Tang; Jinjuan, Feng (2017) Supporting Stroke Motor Recovery Through a Mobile Application: A Pilot Study. American Journal of Occupational Therapy 71(3): 1-5	- Study design not relevant to this review protocol *Single arm trial*
Lazarus, Gilbert, Permana, Affan Priyambodo, Nugroho, Setyo Widi et al. (2020) Telestroke strategies to enhance acute stroke management in rural settings: A systematic review and meta-analysis. Brain and behavior 10(10): e01787	- Systematic review used as source of primary studies
Lee, Daegyun and Bae, Youngsook (2022) Interactive Videogame Improved Rehabilitation Motivation and Walking Speed in Chronic Stroke Patients: A Dual-Center Controlled Trial. Games for health journal 11(4): 268-274	- Study does not contain an intervention relevant to this review protocol *Computer-based tool delivered in hospital with therapist supervision (therefore not telerehabilitation)*
Lee, Jaime, Fowler, Robert, Rodney, Daniel et al. (2010) IMITATE: An intensive computer-based treatment for aphasia based on action observation and imitation. Aphasiology 24(4): 449-465	- Study design not relevant to this review protocol
LeLaurin, Jennifer H, Freytes, I Magaly, Findley, Kimberly E et al. (2021) Feasibility and acceptability of a telephone and web-based stroke caregiver intervention: a pilot randomized controlled trial of the RESCUE intervention. Clinical rehabilitation 35(2): 253-265	- Comparator in study does not match that specified in this review protocol *Compares a telephone and internet intervention to a telephone intervention (both telemedicine interventions)*

Study	Code [Reason]
Levy, Tamina, Killington, Maggie, Lannin, Natasha et al. (2021) Viability of using a computer tablet to monitor an upper limb home exercise program in stroke. Physiotherapy theory and practice 37(2): 331-341	- Study design not relevant to this review protocol *Single arm substudy of a single arm cohort from a randomised controlled trial*
Li, Li, Huang, Jia, Wu, Jingsong et al. (2020) A Mobile Health App for the Collection of Functional Outcomes After Inpatient Stroke Rehabilitation: Pilot Randomized Controlled Trial. JMIR mHealth and uHealth 8(5): e17219	- Comparator in study does not match that specified in this review protocol *Compares two types of telerehabilitation (videoconference follow-up and telephone follow-up)*
Li, Z., Lei, Y., Bui, Q. et al. (2022) A Technology-Augmented Intervention to Promote Self-Management Self-Efficacy among Persons with Stroke: A Pilot Feasibility Study. Archives of Physical Medicine and Rehabilitation 103(12): e195	- Conference abstract
Linder, Susan M., Reiss, Aimee, Buchanan, Sharon et al. (2013) Incorporating Robotic-Assisted Telerehabilitation in a Home Program to Improve Arm Function Following Stroke. Journal of Neurologic Physical Therapy 37(3): 125-132	- Study design not relevant to this review protocol
Linder, Susan M, Rosenfeldt, Anson B, Bay, R Curtis et al. (2015) Improving Quality of Life and Depression After Stroke Through Telerehabilitation. The American journal of occupational therapy : official publication of the American Occupational Therapy Association 69(2): 6902290020p1-10	- Study does not contain an intervention relevant to this review protocol *Inpatients therapy not remotely delivered*
Linder, Susan M, Rosenfeldt, Anson B, Reiss, Aimee et al. (2013) The home stroke rehabilitation and monitoring system trial: a randomized controlled trial. International journal of stroke : official journal of the International Stroke Society 8(1): 46-53	- Study design not relevant to this review protocol
Lio, T.S., Uetake, S., Bates, T.R. et al. (2021) An Australian stroke unit team's experience of recruitment to the AVERT DOSE trial during the COVID-19 pandemic. International Journal of Stroke 16(1suppl): 19	- Conference abstract
Liu, X., Huang, X., Lin, J. et al. (2018) Computer aided technology-based cognitive rehabilitation efficacy against patients' cerebral stroke. NeuroQuantology 16(4): 86-92	- Study does not contain an intervention relevant to this review protocol *Inpatients therapy not remotely delivered*
Lo, Y.-P., Chiang, S.-L., Lin, C.-H. et al. (2021) Effects of individualized aerobic exercise training on physical activity and health-related physical fitness among	- Population not relevant to this review protocol

Study	Code [Reason]
middle-aged and older adults with multimorbidity: A randomized controlled trial. International Journal of Environmental Research and Public Health 18(1): 1-17	
Lum, PS, Uswatte, G, Taub, E et al. (2006) A telerehabilitation approach to delivery of constraint-induced movement therapy. Journal of Rehabilitation Research and Development 43(3): 391-400	- Study design not relevant to this review protocol
Lundstrom, E., Eriksson, S., Holmback, U. et al. (2019) Effects of a short message service-guided training after acute stroke or TIA (STROKEWALK): A randomized controlled trial. European Geriatric Medicine 10(supplement1): 158-s159	- Conference abstract
Lutz, Barbara J, Chumbler, Neale R, Lyles, Teresa et al. (2009) Testing a home-telehealth programme for US veterans recovering from stroke and their family caregivers. Disability and rehabilitation 31(5): 402-9	- Study design not relevant to this review protocol *Single arm trial*
Lv, Meina, Wu, Tingting, Jiang, Shaojun et al. (2021) Effects of Telemedicine and mHealth on Systolic Blood Pressure Management in Stroke Patients: Systematic Review and Meta-Analysis of Randomized Controlled Trials. JMIR mHealth and uHealth 9(6): e24116	- Systematic review used as source of primary studies
Lynch, Elizabeth A, Jones, Taryn M, Simpson, Dawn B et al. (2018) Activity monitors for increasing physical activity in adult stroke survivors. The Cochrane database of systematic reviews 7: cd012543	- Systematic review used as source of primary studies
Maasland, E, Koudstaal, P J, Habbema, J D F et al. (2007) Effects of an individualized multimedia computer program for health education in patients with a recent minor stroke or transient ischemic attack - a randomized controlled trial. Acta neurologica Scandinavica 115(1): 41-8	- Population not relevant to this review protocol *Around 50% of people had a transient ischaemic attack*
MacLeod, G and Barlow, I (2004) Tele-occupational therapy. Providing seating intervention in a rural setting through tele-health. Occupational Therapy Now 6(6): 3-5	- Study design not relevant to this review protocol *Report only*
Maddahi, A, Bani Hani, J, Asgari, A et al. (2021) Therapists' perspectives on a new portable hand telerehabilitation platform for home-based personalized treatment of stroke patients. European review for medical and pharmacological sciences 25(18): 5790-5800	- Population not relevant to this review protocol *The population of interest were therapists*

Study	Code [Reason]
Maier, Martina, Banuelos, Nuria Leiva, Ballester, Belen Rubio et al. (2017) Conjunctive rehabilitation of multiple cognitive domains for chronic stroke patients in virtual reality. IEEE ... International Conference on Rehabilitation Robotics : [proceedings] 2017: 947-952	- Study does not contain an intervention relevant to this review protocol *Discusses computer-based cognitive rehabilitation completed in hospital (therefore not telerehabilitation)*
Mallet, K., Shamloul, R., Lecompte-Collin, J. et al. (2017) Telerehab for patients with post-stroke communication deficits using mobile technology: A randomized controlled trial. International Journal of Stroke 12(4supplement1): 18	- Conference abstract
Mallet, Karen, Shamloul, Rany, Pugliese, Michael et al. (2019) RecoverNow: A patient perspective on the delivery of mobile tablet-based stroke rehabilitation in the acute care setting. International journal of stroke : official journal of the International Stroke Society 14(2): 174-179	- Study design not relevant to this review protocol *Single arm trial (collecting survey data)*
Mallo-Lopez, Ana, Fernandez-Gonzalez, Pilar, Sanchez-Herrera-Baeza, Patricia et al. (2022) The Use of Portable Devices for the Instrumental Assessment of Balance in Patients with Chronic Stroke: A Systematic Review. International journal of environmental research and public health 19(17)	- Study does not contain an intervention relevant to this review protocol *Assessment-based intervention*
Manheim, LM; Halper, AS; Cherney, L (2009) Patient-reported changes in communication after computer-based script training for aphasia. Archives of Physical Medicine and Rehabilitation 90(4): 623-7	- Study design not relevant to this review protocol *Single arm trial*
Marshall, Jane, Caute, Anna, Chadd, Katie et al. (2019) Technology-enhanced writing therapy for people with aphasia: results of a quasi-randomized waitlist controlled study. International journal of language & communication disorders 54(2): 203-220	- Study design not relevant to this review protocol
Marwaa, Mille Nabsen, Guidetti, Susanne, Ytterberg, Charlotte et al. (2022) Use of Mobile/Tablet and Web-Based Applications to Support Rehabilitation After Stroke: A Scoping Review. Journal of rehabilitation medicine 54: jrm00269	- Systematic review used as source of primary studies
Mawson, SJ and Mountain, GM (2011) The SMART rehabilitation system for stroke self-management: Issues and challenges for evidence-based health technology research. Journal of Physical Therapy Education 25(1): 48-53	- Review article but not a systematic review
Mayo, NE, Nadeau, L, Ahmed, S et al. (2008) Bridging the gap: the effectiveness of teaming a stroke	- Study does not contain an intervention relevant to this review protocol

Study	Code [Reason]
coordinator with patient's personal physician on the outcome of stroke. Age and Ageing 37(1): 32-8	*Study does not contain an intervention relevant to this review protocolStudy reported a passive case management intervention rather than a rehabilitation intervention which fell outside the scope of this review.(This study was included in the Cochrane review)*
Mclaughlin, M, Nam, Y, Sanders, S et al. (2010) Virtual environments for stroke recovery: pilot clinicaltrials for user-centric patient/clinician distributionplatform with tele-rehabilitation application usinghaptics devices. International journal of stroke	- Full text paper not available
Mingming, Ye, Bolun, Zhao, Zhijian, Liu et al. (2022) Effectiveness of computer-based training on post-stroke cognitive rehabilitation: A systematic review and meta-analysis. Neuropsychological rehabilitation 32(3): 481-497	- Study does not contain an intervention relevant to this review protocol *Computer-based training not specific to telerehabilitation*
Mirelman, A (2007) Comparison of robotic-virtual reality lower extremity training with robotic lower extremity training alone for rehabilitation of gait of individuals post-stroke. Comparison of Robotic-virtual Reality Lower Extremity Training With Robotic Lower Extremity Training Alone for Rehabilitation of Gait of Individuals Post-stroke: 218p-218p	- Full text paper not available *Dissertation, not available for order*
Mirelman, Anat; Bonato, Paolo; Deutsch, Judith E (2009) Effects of training with a robot-virtual reality system compared with a robot alone on the gait of individuals after stroke. Stroke 40(1): 169-74	- No relevant outcomes reported
Mitchell, Claire, Bowen, Audrey, Tyson, Sarah et al. (2018) ReaDySpeech for people with dysarthria after stroke: protocol for a feasibility randomised controlled trial. Pilot and feasibility studies 4: 25	- Study design not relevant to this review protocol
Moniche, F, De La Torre Laviana, FJ, Palomino García, A et al. (2012) Evaluation of telephone assessment in stroke and TIA recurrence. Neurologia (Barcelona, Spain) 27(2): 97-102	- Study design not relevant to this review protocol
Moulaei, Khadijeh, Sheikhtaheri, Abbas, Nezhad, Mansour Shahabi et al. (2022) Telerehabilitation for upper limb disabilities: a scoping review on functions, outcomes, and evaluation methods. Archives of public health = Archives belges de sante publique 80(1): 196	- Systematic review used as source of primary studies
Naqvi, Imama A, Cheung, Ying Kuen, Strobino, Kevin et al. (2022) TASC (Telehealth After Stroke Care): a	- Study design not relevant to this review protocol

Study	Code [Reason]
study protocol for a randomized controlled feasibility trial of telehealth-enabled multidisciplinary stroke care in an underserved urban setting. Pilot and feasibility studies 8(1): 81	
Obembe, A.; Odole, A.; Akinnawo, A. (2021) The role of telehealth physical therapy in stroke: A systematic review. International Journal of Stroke 16(2suppl): 149	- Conference abstract
Ora, Hege Prag, Kirmess, Melanie, Brady, Marian C et al. (2020) Technical Features, Feasibility, and Acceptability of Augmented Telerehabilitation in Post-stroke Aphasia-Experiences From a Randomized Controlled Trial. Frontiers in neurology 11: 671	- Data not reported in an extractable format or a format that can be analysed
Ortiz-Fernandez, Leire, Sagastagoya Zabala, Joana, Gutierrez-Ruiz, Agustin et al. (2019) Efficacy and Usability of eHealth Technologies in Stroke Survivors for Prevention of a New Stroke and Improvement of Self-Management: Phase III Randomized Control Trial. Methods and protocols 2(2)	- Study design not relevant to this review protocol
Ostrowska, Paulina Magdalena, Sliwinski, Maciej, Studnicki, Rafal et al. (2021) Telerehabilitation of Post-Stroke Patients as a Therapeutic Solution in the Era of the Covid-19 Pandemic. Healthcare (Basel, Switzerland) 9(6)	- Systematic review used as source of primary studies
Paik, S.M. and Cramer, S.C. (2021) Patients most likely to benefit from home-based telerehabilitation after stroke. Stroke 52(suppl1)	- Conference abstract
Penaloza, Claudia, Scimeca, Michael, Gaona, Angelica et al. (2021) Telerehabilitation for Word Retrieval Deficits in Bilinguals With Aphasia: Effectiveness and Reliability as Compared to In-person Language Therapy. Frontiers in neurology 12: 589330	- Comparator in study does not match that specified in this review protocol *Compares treatment delivered using a computer based model that determines the optimal language to use for therapy compared to the same computer based model but using the non-optimal language for therapy instead*
Pfeiffer, Klaus, Beische, Denis, Hautzinger, Martin et al. (2014) Telephone-based problem-solving intervention for family caregivers of stroke survivors: a randomized controlled trial. Journal of consulting and clinical psychology 82(4): 628-43	- Study does not contain an intervention relevant to this review protocol *Telephone intervention but not rehabilitation (more a problem solving intervention) therefore not telerehabilitation*
Pignolo, L., Arabia, G., Contrada, M. et al. (2021) Clinical efficacy of cognitive stimulation in aged	- Conference abstract

Study	Code [Reason]
subjects with mild and moderate cognitive impairment. European Geriatric Medicine 12(suppl1): 114	
Poulsen, M.B., Badawey, J., Anhoj, M. et al. (2016) Early web-based tele-rehabilitation in stroke patients: A randomised controlled pilot study. European Journal of Neurology 23(suppl2): 460	- Conference abstract
Qu, Y (2015) Effectiveness, safety and cost efficiency of telerehabilitation for stroke patients in hospital and home.	- Full text paper not available *Clinical trial record*
Ramage, E.R., Fini, N.A., Lynch, E.A. et al. (2021) Supervised exercises in standing positions delivered via telehealth for people with stroke to provide access to therapy in the context of COVID-19. Solution or compromise?. International Journal of Stroke 16(1suppl): 25-26	- Conference abstract
Redzuan, Nor Shahizan, Engkasan, Julia P, Mazlan, Mazlina et al. (2012) Effectiveness of a video-based therapy program at home after acute stroke: a randomized controlled trial. Archives of physical medicine and rehabilitation 93(12): 2177-83	- Study does not contain an intervention relevant to this review protocol *No two way communication channel for patient to communicate with therapist*
Rochette, A., Korner-Bitensky, N., Bishop, D. et al. (2013) The YOU CALL-WE CALL randomized clinical trial impact of a multimodal support intervention after a mild stroke. Circulation: Cardiovascular Quality and Outcomes 6(6): 674-679	- Study does not contain an intervention relevant to this review protocol *Telephone intervention but not specifically rehabilitation (not education) therefore this was not deemed to be a rehabilitation intervention so fell outside the scope of this review.(This study was included in the Cochrane review)*
Saal, Susanne, Becker, Christiane, Lorenz, Silke et al. (2015) Effect of a stroke support service in Germany: a randomized trial. Topics in stroke rehabilitation 22(6): 429-36	- Study does not contain an intervention relevant to this review protocol *Telephone intervention but not specifically rehabilitation (more case management support) therefore this was not deemed to be a rehabilitation intervention so fell outside the scope of this review.(This study was included in the Cochrane review)*
Sakakibara, Brodie M, Lear, Scott A, Barr, Susan I et al. (2022) Telehealth coaching to improve self-management for secondary prevention after stroke: A randomized controlled trial of Stroke Coach. International journal of stroke : official journal of the International Stroke Society 17(4): 455-464	- Comparator in study does not match that specified in this review protocol *Compares two different types of telerehabilitation (both approaches involve telephone follow up and*

Study	Code [Reason]
	intervention of different forms, which are not relevant comparisons for this review)
Saposnik, Gustavo, Chow, Chi-Ming, Gladstone, David et al. (2014) iPad technology for home rehabilitation after stroke (iHOME): a proof-of-concept randomized trial. International journal of stroke : official journal of the International Stroke Society 9(7): 956-62	- Study design not relevant to this review protocol
Say Well, N.; Vandal, A.C.; Taylor, D. (2017) Augmented community telerehabilitation intervention to improve outcomes for people with stroke AKTIV-a randomised controlled trial. Cerebrovascular Diseases 43(supplement1): 166	- Conference abstract
Saywell, Nicola, Vandal, Alain C, Brown, Paul et al. (2012) Telerehabilitation to improve outcomes for people with stroke: study protocol for a randomised controlled trial. Trials 13: 233	- Study design not relevant to this review protocol
Schroder, Jonas, van Criekinge, Tamaya, Embrechts, Elissa et al. (2019) Combining the benefits of tele-rehabilitation and virtual reality-based balance training: a systematic review on feasibility and effectiveness. Disability and rehabilitation. Assistive technology 14(1): 2-11	- Systematic review used as source of primary studies
Shamloul, R (2015) TeleRehab for Stroke Patients Using Mobile Technology.	- Full text paper not available *Clinical trial record*
Shin, Doo-Chul (2020) Smartphone-based visual feedback trunk control training for gait ability in stroke patients: A single-blind randomized controlled trial. Technology and health care : official journal of the European Society for Engineering and Medicine 28(1): 45-55	- Study does not contain an intervention relevant to this review protocol *Technology-based intervention, but not telerehabilitation as conducted in hospital rather than over a distance and conducted with healthcare professional involvement*
Srinivasan, V., Maruthey, N., Suganthirababu, P. et al. (2022) Efficacy of self-monitoring virtual feedback exercises for upper motor neuron facial palsy. A double blinded randomized control study. European Journal of Molecular and Clinical Medicine 9(8): 471-479	- Study does not contain an intervention relevant to this review protocol *Computer-based therapy but the app does not allow for communication with a therapist during therapy or for feedback from a therapist during the process*
Szturm, T, Imran, Z, Gandhi, DBC et al. (2018) Telerehabilitation using a game-assisted repetitive task practice platform to improve upper extremity function after stroke: feasibility study. International journal of stroke 13(2supplement1): 50	- Conference abstract

Study	Code [Reason]
Tan, CO (2020) Is remote rehabilitation after stroke as effective as conventional therapy?. Neurology 95(17): e2462-e2464	- Study design not relevant to this review protocol
Taylor, D., Saywell, N., Mudge, S. et al. (2018) Telerehabilitation can improve outcomes after stroke; but only if you do it. International Journal of Stroke 13(2supplement1): 235	- Conference abstract
Tenforde, Adam S., Zafonte, Ross, Hefner, Jaye et al. (2020) Evidence-Based Physiatry: Efficacy of Home-Based Telerehabilitation Versus In-Clinic Therapy for Adults After Stroke. American Journal of Physical Medicine & Rehabilitation 99(8): 764-765	- Study design not relevant to this review protocol
Thompson-Butel, A.; Woodbridge, G.; Faux, S. (2017) A telehealth transfer package to improve upperlimb rehabilitation post-stroke - The protocol. International Journal of Stroke 12(3supplement1): 58	- Conference abstract
Torrisi, Michele, Maresca, Giuseppa, De Cola, Maria Cristina et al. (2019) Using telerehabilitation to improve cognitive function in post-stroke survivors: is this the time for the continuity of care?. International journal of rehabilitation research. Internationale Zeitschrift fur Rehabilitationsforschung. Revue internationale de recherches de readaptation 42(4): 344-351	- No relevant outcomes reported
Tousignant, M (2013) A Randomized, Non-inferiority Clinical Trial of CVA Telerehabilitation Treatments - TelePhysioTaiChi.	- Full text paper not available
Tousignant, M.; Macoir, J.; Martel-Sauvageau, V. (2016) In-home telerehabilitation for speech therapy with patients presenting chronic post-stroke aphasia: Are the patients satisfied with the treatment received?. Cerebrovascular Diseases 41(suppl1): 308	- Conference abstract
Tousignant, Michel, Corriveau, Helene, Kairy, Dahlia et al. (2014) Tai Chi-based exercise program provided via telerehabilitation compared to home visits in a post-stroke population who have returned home without intensive rehabilitation: study protocol for a randomized, non-inferiority clinical trial. Trials 15: 42	- Study design not relevant to this review protocol *Protocol only*
Vallentin, T., Packham, T., Fleck, R. et al. (2018) Integrating telepractice into post-stroke hospital-based outpatient rehabilitation: A pilot study. International Journal of Stroke 13(2supplement1): 173	- Conference abstract

Study	Code [Reason]
van den Berg, Maayken, Crotty, Maria Prof, Liu, Enwu et al. (2016) Early Supported Discharge by Caregiver-Mediated Exercises and e-Health Support After Stroke: A Proof-of-Concept Trial. Stroke 47(7): 1885-92	- Study does not contain an intervention relevant to this review protocol *Intervention began in hospital with career and only completed remotely if patients were DC*
Vauth, F., Richter, J., Scibor, M. et al. (2016) Tele online therapy in patients with aphasia after stroke. 35: 119-124	- Study not reported in English *Included in the cochrane review but no useable outcomes reported*
Wan, Li-Hong, Zhang, Xiao-Pei, Mo, Miao-Miao et al. (2016) Effectiveness of Goal-Setting Telephone Follow-Up on Health Behaviors of Patients with Ischemic Stroke: A Randomized Controlled Trial. Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association 25(9): 2259-70	- No relevant outcomes reported *Reports modified Rankin scale and health behaviour scores (no relevant outcomes to the protocol) This study was included in the Cochrane review*
Whelan, B.-M., Theodoros, D., Cahill, L. et al. (2022) Feasibility of a Telerehabilitation Adaptation of the Be Clear Speech Treatment Program for Non-Progressive Dysarthria. Brain Sciences 12(2): 197	- Study design not relevant to this review protocol
Woolf, Celia, Caute, Anna, Haigh, Zula et al. (2016) A comparison of remote therapy, face to face therapy and an attention control intervention for people with aphasia: a quasi-randomised controlled feasibility study. Clinical rehabilitation 30(4): 359-73	- Study design not relevant to this review protocol
Worthen-Chaudhari, Lise (2015) Effectiveness, usability, and cost-benefit of a virtual reality-based telerehabilitation program for balance recovery after stroke: a randomized controlled trial. Archives of physical medicine and rehabilitation 96(8): 1544	- Study design not relevant to this review protocol
Yosef, A.B., Jacobs, J.M., Shames, J. et al. (2022) A Performance-Based Teleintervention for Adults in the Chronic Stage after Acquired Brain Injury: An Exploratory Pilot Randomized Controlled Crossover Study. Brain Sciences 12(2): 213	- No relevant outcomes reported
Zhang, L., Yan, Y.-N., Sun, Z.-X. et al. (2022) Effects of Coaching-Based Teleoccupational Guidance for Home-Based Stroke Survivors and Their Family Caregivers: A Pilot Randomised Controlled Trial. International Journal of Environmental Research and Public Health 19(23): 16355	- Comparator in study does not match that specified in this review protocol *Compares two different types of telerehabilitation*
Zhang, Li, Yan, Yanning, Sun, Zengxin et al. (2022) Coaching-Based Teleoccupational Guidance for Home-Based Stroke Survivors and Their Family Caregivers:	- Study design not relevant to this review protocol

Study	Code [Reason]
Study Protocol for a Superior Randomized Controlled Trial. Evidence-based complementary and alternative medicine : eCAM 2022: 9123498	

J.2 Health Economic studies

Published health economic studies that met the inclusion criteria (relevant population, comparators, economic study design, published 2006 or later and not from non-OECD country or USA) but that were excluded following appraisal of applicability and methodological quality are listed below. See the health economic protocol for more details.

Table 13: Studies excluded from the health economic review

Reference	Reason for exclusion
None.	

Appendix K Recommendation for research – full details

K.1 Recommendation for research

What is the impact of telerehabilitation on cognition and mood for people after stroke?

K.1.1 Why this is important

Telerehabilitation as a method of delivering stroke rehabilitation services is becoming increasingly used in clinical practice. This was in part due to the COVID-19 pandemic with many stroke services now employing this method of delivery as standard practice. Evidence from this review showed that telerehabilitation delivered in various formats and by different members of the multidisciplinary team can be just as effective as face-to-face rehabilitation. However, there was an unexplained increase in depression reported by several outcomes in people who participated in telerehabilitation. Additionally, there appeared to be a lack of efficacy in a number of cognitive outcomes for people receiving cognitive therapy. The committee agreed that research examining the effect of these interventions on mood and cognition is required. They also suggested that qualitative research to capture the experiences of the person after stroke and those involved in their life would be beneficial.

K.1.2 Rationale for the recommendation for research

Importance to 'patients' or the population	Telerehabilitation is becoming increasingly used for stroke rehabilitation to deliver a wide range of services and therapies. This form of delivering therapy may be better suited to some people than others, and may be more appropriate for delivering some types of therapy than others. While this appeared to lead to better outcomes for physical function-related outcomes in this review, worse outcomes were seen in small trials reporting psychological function and cognitive outcomes. It is important to determine if this form of therapy is appropriate for all therapy types and if there are any associated side effects to be aware of. Taking into account the views of people after stroke and those involved in their lives is important to understand the true extent of these effects so that this can be understood completely to allow people to be reassured that they can receive the same quality of care at home as they would receive in person.
Relevance to NICE guidance	Telerehabilitation is increasingly being employed in current practice for a number of services. This review showed that telerehabilitation was non inferior to face to face therapy for the majority of outcomes. However, there was a trend towards and increase in depression and worse cognitive outcomes associated with telerehabilitation seen in small studies of low quality. It is important to determine if there are any associated risks with telerehabilitation or any forms of therapy that should not be delivered remotely so that this can inform future guidance.
Relevance to the NHS	This research is relevant to the NHS as telerehabilitation as a method of delivering therapy remotely is being increasingly used across NHS services since the COVID-19 pandemic. These methods can also result in cost saving for the NHS. If

	there are any associated risks with this form of therapy, it is important for these to be highlighted.
National priorities	Digitally enabled care is a part of the NHS Long Term Plan and so is a National Priority of the NHS. This was accelerated by the COVID-19 pandemic.
Current evidence base	The evidence identified in this review comprised of several different forms of therapies and types of telerehabilitation delivery. Overall the evidence showed that telerehabilitation was equally as effective as face to face therapy for the majority of outcomes.
Equality considerations	There are some people who may struggle with the use of telerehabilitation and who need to be considered when obtaining views about the impact of telerehabilitation to ensure that the diverse views of the population who may use services are captured. These may include: - People with communication difficulties - People with cognitive difficulties - People with sensory differences (for example: visual or hearing impairment) - People from areas of more socioeconomic deprivation who may not have access to the equipment required - People who have no experience using computers or similar technologies

K.1.3 Modified PICO table

Population	Inclusion: Adults (age ≥16 years) who have had a first or recurrent stroke (including people after subarachnoid haemorrhage). In addition (for qualitative data): Family members of adults who have had a first or recurrent stroke Carers supporting adults after a first or recurrent stroke Healthcare professionals supporting adults after a first or recurrent stroke Adult social care workers supporting adults after a first or recurrent stroke Voluntary sector professionals supporting adults after a first or recurrent stroke Exclusion: Children (age <16 years) People who have had a transient ischaemic attack
Intervention	Quantitative data

	• Telerehabilitation (the delivery of rehabilitation services via information and communication technologies) Qualitative data Views, opinions and experiences relating to telerehabilitation (including the potential barriers and facilitators)
Comparator	Quantitative data • In person rehabilitation Qualitative data N/A
Outcome	Quantitative data • Person/participant generic health-related quality of life • Carer generic health-related quality of life • Psychological distress • Stroke-specific measures of cognition • Stroke-specific Patient-Reported Outcome Measures • Withdrawal due to adverse events Qualitative data Views, opinions and experiences relating to telerehabilitation and specifically the effect this had on people's quality of life including their psychological wellbeing
Study design	• Randomised controlled trial • Qualitative interview (either individual or through focus groups)
Timeframe	6 months
Additional information	Subgroup analyses for quantitative data: Presence of communication difficulties at baseline Presence of cognitive difficulties at baseline