# CANADIAN STROKE BEST PRACTICE RECOMMENDATIONS

## Rehabilitation, Recovery and Community Participation Following Stroke

## Part Two: Delivery of Stroke Rehabilitation to Optimize Functional Recovery Evidence Tables

## 7th edition, update 2025

## *Mobility, Balance and Transfers*

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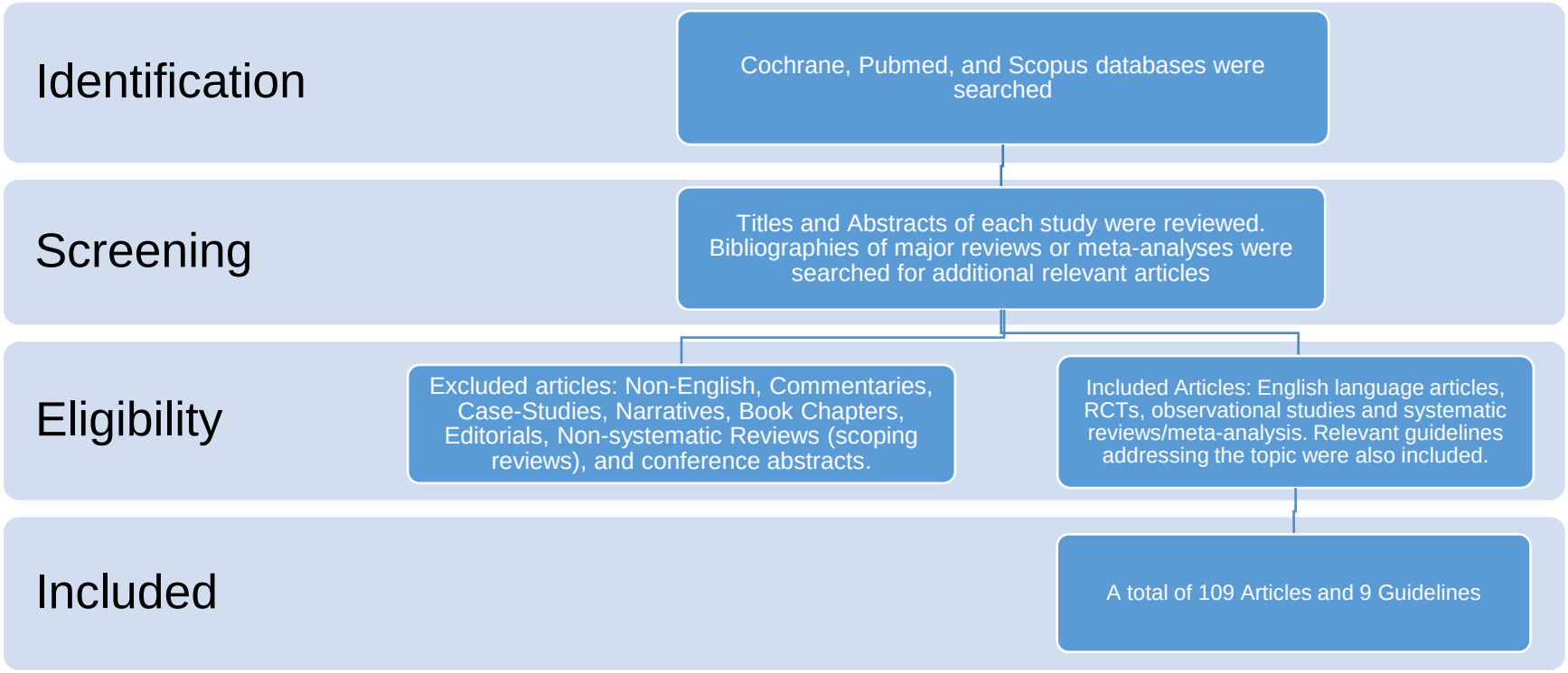
## Search Strategy




Cochrane, PubMed and Scopus databases were searched using terms such (Stroke OR “cerebrovascular disease”) AND (“lower limb” OR “lower extremity”) AND (rehabilitation OR motor recovery OR gait OR balance). Titles and abstract of each article were reviewed for relevance. Bibliographies were reviewed to find additional relevant articles. Articles were excluded if they were: non-English, commentaries, case-studies, narrative, book chapters, editorials, non-systematic review, or conference abstracts. Additional searches for relevant best practice guidelines were completed and included in a separate section of the review. A total of 109 articles and 9 guidelines were included and were separated into separate categories designed to answer specific questions.

# Published Guidelines

| Guideline | Recommendations |
|---|---|
| **Management of Stroke Rehabilitation Working Group. VA/DoD clinical practice guideline for the management of stroke rehabilitation. Washington (DC): Veterans Health Administration, Department of Defense; Version 5.0 – 2024.**<br><br>**Available at:** https://www.healthquality.va.gov/guidelines/Rehab/stroke/ | We recommend task-specific practice (also known as task-oriented practice or repetitive task practice) to improve motor function, gait, posture, and activities of daily living. Strong (for)<br><br>There is insufficient evidence to recommend for or against body-weight support treadmill training to improve motor outcomes. Neither for nor against<br><br>We suggest rhythmic auditory stimulation as an adjunct intervention to improve motor outcomes. Weak (for).<br><br>There is insufficient evidence to recommend for or against the use of high intensity interval training over moderate intensity continuous training to enhance gait recovery. Neither for nor against<br><br>There is insufficient evidence to recommend for or against aquatic therapy, as compared with land-based therapy, to improve mobility, balance, and activities of daily living. Neither for nor against<br><br>There is insufficient evidence to recommend for or against aquatic therapy, as compared with land-based therapy, to improve mobility, balance, and activities of daily living. Neither for nor against<br><br>There is insufficient evidence to recommend for or against biofeedback as an adjunct intervention to improve motor outcomes. Neither for nor against<br><br>There is insufficient evidence to recommend for or against motor imagery to improve motor function. Neither for nor against.<br><br>There is insufficient evidence to recommend for or against acupuncture to improve motor function. Neither for nor against<br><br>We suggest neuromuscular electrical stimulation to improve motor outcomes. Weak (for)<br><br>There is insufficient evidence to recommend for or against robot-assisted therapy to improve upper or lower extremity motor outcomes. Neither for nor against<br><br>There is insufficient evidence to recommend for or against virtual reality to improve balance or enhance gait recovery. Neither for nor against |
| **National Clinical Guideline for Stroke for the UK and Ireland. London: Intercollegiate Stroke Working Party; 2023 May 4.**<br><br>**Available at:** www.strokeguideline.org**.** | People with weakness after stroke should be taught task-specific, repetitive, intensive exercises or activities to increase their strength. Exercise and repetitive task practice should be the principal rehabilitation approaches, in preference to other therapy approaches including Bobath.<br><br>People with impaired balance at any level (sitting, standing, stepping, walking) at any time after stroke should receive repetitive task practice in the form of progressive balance training such as trunk control exercises, treadmill training, circuit and functional training, fitness training, and strengthening exercises. |

| Guideline | Recommendations |
|---|---|
| | People with limitations of dorsiflexion or ankle instability causing balance limitations after stroke should be considered for ankle-foot orthoses and/or functional electrical stimulation. The person with stroke, their family/carers and clinicians in all settings should be trained in the safe use and application of orthoses and electrical stimulation devices.<br><br>People with limitations of their standing balance or confidence after stroke should be offered walking aids to improve their stability.<br><br>People with stroke who are able to walk (albeit with the assistance of other people or assistive devices) and who wish to improve their mobility at any stage after stroke should be offered access to equipment to enable intensive walking training such as treadmills or electromechanical gait trainers. To achieve this, training needs to be at 60-85% heart rate reserve (by adjustment of inclination or speed) for at least 40 minutes, three times a week for 10 weeks. |
| **Clinical Guidelines for Stroke Management 2022. Melbourne (Australia): National Stroke Foundation. Section 5. Rehabilitation** | For stroke survivors, rehabilitation should be structured to provide as much scheduled therapy (occupational therapy and physiotherapy) as possible. For stroke survivors, group circuit class therapy should be used to increase scheduled therapy time. (strong recommendation)<br><br>Stroke survivors should be encouraged to continue with active task practice outside of scheduled therapy sessions. This could include strategies such as:<br>• self-directed, independent practice;<br>• semi-supervised and assisted practice involving family/friends, as appropriate.<br><br>A minimum of three hours a day of scheduled therapy (occupational therapy and physiotherapy) is recommended, ensuring at least two hours of active task practice occurs during this time. (weak recommendation)<br><br>For stroke survivors, rehabilitation should include individually-tailored exercise interventions to improve cardiorespiratory fitness. (strong recommendation)<br><br>All stroke survivors should commence cardiorespiratory training during their inpatient stay. Stroke survivors should be encouraged to participate in ongoing regular physical activity regardless of their level of disability.<br><br>For stroke survivors who have difficulty sitting, practising reaching beyond arm's length while sitting with supervision/assistance should be undertaken. (strong recommendation)<br><br>For stroke survivors who have difficulty in standing up from a chair, practice of standing up should be undertaken. (strong recommendation)<br><br>For stroke survivors who have difficulty standing, task-specific practice of standing balance should be provided. Strategies could include:<br>• practising functional tasks while standing;<br>• walking training that includes challenge to standing balance (e.g. overground walking, obstacle courses).<br><br>For stroke survivors who have difficulty with standing balance, virtual reality including treadmill training with virtual reality or use of Wii Balance Boards may be used. (weak recommendation) |

| Guideline | Recommendations |
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| | Stroke survivors with difficulty walking should be given the opportunity to undertake tailored repetitive practice of walking (or components of walking) as much as possible. The following modalities may be used:<br>• Circuit class therapy (with a focus on overground walking practice);<br>• Treadmill training with or without body weight support<br><br>For stroke survivors with difficulty walking, one or more of the following interventions may be used in addition to those listed above: (weak recommendation)<br>• Virtual reality training.<br>• Electromechanically assisted gait training.<br>• Biofeedback.<br>• Cueing of cadence.<br>• Electrical stimulation.<br><br>For stroke survivors, individually fitted lower limb orthoses may be used to minimise limitations in walking ability. Improvement in walking will only occur while the orthosis is being worn. (weak recommendation)<br><br>For stroke patients, a falls risk assessment, including fear of falling, should be undertaken on admission to hospital. A management plan should be initiated for all patients identified as at risk of falls. For stroke survivors at high risk of falls, a comprehensive home assessment for the purposes of reducing falling hazards should be carried out by a qualified health professional. Appropriate home modifications (as determined by a health professional) for example installation of grab rails and ramps may further reduce falls risk.<br>For stroke survivors who are at risk of falling, multifactorial interventions in the community, including an individually prescribed exercise program and advice on safety, should be provided. |
| **Johnston TE, Keller S, Denzer-Weiler C, Brown L.**<br><br>**A Clinical Practice Guideline for the Use of Ankle-Foot Orthoses and Functional Electrical Stimulation Post-Stroke.**<br><br>***J Neurol Phys Ther*. 2021 Apr 1;45(2):112-196.** | Strong evidence exists that AFO and FES can each increase gait speed, mobility, and dynamic balance.<br><br>Moderate evidence exists that AFO and FES increase quality of life, walking endurance, and muscle activation, while the evidence is weak for improving gait kinematics.<br><br>AFO or FES should not be used to decrease plantar flexor spasticity.<br><br>Comparing AFO and FES, no strong evidence supports the overall superiority of one over the other; however, evidence suggests that AFO may lead to more compensatory effects while FES may lead to more therapeutic effects.<br><br>Due to the potential for gains at any phase post-stroke, the most appropriate device for an individual may change, and reassessments should be completed to ensure the device is meeting the individual's needs. |
| **MacKay-Lyons M, Billinger SA, Eng JJ, Dromerick A, Giacomantonio N, Hafer-Macko C et al.**<br><br>**Aerobic Exercise Recommendations** | Aerobic exercise programs can be administered in a variety of barrier-free and accessible settings: hospital, outpatient clinics, community, and home. Training of high-risk individuals must be done in a setting with immediate access to external defibrillation and emergency medical response. For lower-risk individuals, home-based aerobic exercise programs may be a safe and effective option (LOE = C). |

| Guideline | Recommendations |
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| **to Optimize Best Practices in Care After Stroke: AEROBICS 2019 Update.**<br><br>***Phys Ther*. 2020 Jan 23;100(1):149-156.**<br><br>**(selected)** | Any mode of exercise that activates a large muscle mass for a prolonged period can be used to induce an aerobic training effect (LOE = B).<br><br>A minimum of 8 weeks of aerobic exercise is recommended to achieve a clinically meaningful training effect. However, physical activity should be sustained indefinitely to maintain health benefits (LOE = B)<br><br>Structured aerobic exercise should be conducted a minimum of 3 d/wk. On the other days of the week, participants are encouraged to engage in lighter forms of physical activity (LOE = B).<br><br>Aerobic exercise sessions of >20 minutes are recommended, depending on exercise frequency and intensity. Warm-up and cool-down periods of 3 to 5 minutes are also advised. A gradual progression in the duration may be required, starting with bouts of 5 minutes or less and alternating intervals of rest or lower-intensity exercise (LOE = B).<br><br>Intensity of aerobic exercise must be determined on an individual basis, depending on responses to exercise testing, health status (neurologic status, cardiac, and other comorbidities), and planned exercise frequency and duration. Percentage of heart rate reserve (HRR) is often used to establish the target training intensity. Other markers of intensity, such as percentage of maximal heart rate (% HRmax) and rating of perceived exertion (RPE), can be used, particularly when heart rate is compromised by medication (LOE = B). |
| **Hornby TG, Reisman DS, Ward IG, Scheets PL, Miller A, Haddad D et al; and the Locomotor CPG Appraisal Team.**<br><br>**Clinical Practice Guideline to Improve Locomotor Function Following Chronic Stroke, Incomplete Spinal Cord Injury, and Brain Injury.**<br><br>***J Neurol Phys Ther.* 2020 Jan;44(1):49-100.**<br><br>***(selected)*** | All recommendations have the evidence quality of I-II. All recommendations are for individuals greater than 6 months following acute-onset stroke. All interventions are in comparison with alternative interventions. The recommendation strength is strong for all recommendations except two with weak strength level.<br><br>Recommended interventions:<br>Virtual reality training interventions coupled with walking practice for improving walking speed and distance.<br>Using moderate- to high-intensity walking training interventions (intensities > 60% HR reserve or 70% HRmax) to improve walking speed and distance.<br><br>Interventions may be considered:<br>Static and dynamic (non-walking) balance strategies when coupled with virtual reality or augmented visual feedback to improve walking speed and distance.<br>Circuit training or combined strategies providing balance, strength, and aerobic exercises to improve walking speed and distance (**weak**).<br>Strength training to improve walking speed and distance (**weak**).<br><br>Interventions not recommended to perform:<br>Clinicians should not use sitting or standing balance training with additional vibratory stimuli to improve walking speed and distance.<br>Clinicians should not perform sitting or standing balance training directed toward improving postural stability and weight-bearing symmetry between limbs to improve walking speed and distance.<br>Clinicians should not perform body weight–supported treadmill training for improving walking speed and distance in individuals.<br>Clinicians should not perform walking interventions with exoskeletal robotics on a treadmill or elliptical devices to improve walking |

| Guideline | Recommendations |
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| | speed and distance. |
| **Zhang T, Zhao J, Li X, Bai Y, Wang B, Qu Y et al.**<br><br>**Chinese Stroke Association guidelines for clinical management of cerebrovascular disorders: executive summary and 2019 update of clinical management of stroke rehabilitation.**<br><br>***Stroke and Vascular Neurology* 2020: svn-2019-000321.**<br><br>**(selected)** | 8. Functional electrical stimulation and electromyography biofeedback for the corresponding muscles, combined with conventional rehabilitation, can improve the muscle strength and the function of paralysed limbs (Grade I recommendation, Level B evidence).<br><br>9. It is reasonable for patients who had a stroke with hemiplegia to train standing and walking actively to regain basic walking ability as soon as possible (Grade IIa recommendation, Level B evidence).<br><br>10. Analysis of the hemiplegic gait with an integrative gait analysis system is an effective way to make an elaborate walking programme and improve the quality of walking (Grade I recommendation, Level B evidence).<br><br>11. Lower-limb robots, weight-supporting devices and orthoses is reasonable to assist with walking recovery (Grade IIa recommendation, Level B evidence).<br><br>16. Neuromuscular electrical stimulation (NMES) and local muscle vibration therapy are recommended (Grade I recommendation, Level B evidence). |
| **Winstein CJ, Stein J, Arena R, Bates B, Cherney LR, Cramer SC; et al on behalf of the American Heart Association Stroke Council, Council on Cardiovascular and Stroke Nursing, Council on Clinical Cardiology, and Council on Quality of Care and Outcomes Research.**<br><br>**Guidelines for adult stroke rehabilitation and recovery: a guideline for healthcare professionals from the American Heart Association/American Stroke Association.**<br><br>***Stroke* 2016;47:e98–e169** | It is recommended that individuals with stroke discharged to the community participate in exercise programs with balance training to reduce falls. (B)<br><br>It is recommended that individuals with stroke be provided a formal fall prevention program during hospitalization. (A)<br><br>Tai Chi training may be reasonable for fall prevention. (B)<br><br>Individuals with stroke who have poor balance, low balance confidence, and fear of falls or are at risk for falls should be provided with a balance training program. (A)<br><br>Individuals with stroke should be prescribed and fit with an assistive device or orthosis if appropriate to improve balance. (A)<br><br>Postural training and task-oriented therapy may be considered for rehabilitation of ataxia. (C)<br><br>Intensive, repetitive, mobility- task training is recommended for all individuals with gait limitations after stroke. (A)<br>An AFO after stroke is recommended in individuals with remediable gait impairments (eg, foot drop) to compensate for foot drop and to improve mobility and paretic ankle and knee kinematics, kinetics, and energy cost of walking. (A)<br><br>Group therapy with circuit training is a reasonable approach to improve walking. (A)<br><br>Incorporating cardiovascular exercise and strengthening interventions is reasonable to consider for recovery of gait capacity and gait related mobility tasks. (A)<br><br>NMES is reasonable to consider as an alternative to an AFO for foot drop. (A)<br><br>Practice walking with either a treadmill (with or without body-weight support) or overground walking exercise training combined with conventional rehabilitation may be reasonable for recovery of walking function. (A) |

| Guideline | Recommendations |
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| | Robot-assisted movement training to improve motor function and mobility after stroke in combination with conventional therapy may be considered. (A)<br><br>Mechanically assisted walking (treadmill, electromechanical gait trainer, robotic device, servo-motor) with body weight support may be considered for patients who are nonambulatory or have low ambulatory ability early after stroke. (A)<br><br>There is insufficient evidence to recommend acupuncture for facilitating motor recovery and walking mobility (B)<br><br>The effectiveness of TENS in conjunction with everyday activities for improving mobility, lower extremity strength, and gait speed is uncertain. (B)<br><br>The effectiveness of rhythmic auditory cueing to improve walking speed and coordination is uncertain. (B)<br><br>The usefulness of electromyography biofeedback during gait training in patients after stroke is uncertain. (B)<br><br>Virtual reality may be beneficial for the improvement of gait. (B)<br><br>The effectiveness of neurophysiological approaches (ie, neurodevelopmental therapy, proprioceptive neuromuscular facilitation) compared with other treatment approaches for motor retraining after an acute stroke has not been established. (B)<br><br>The effectiveness of water-based exercise for motor recovery after an acute stroke is unclear. (B)<br><br>The effectiveness of fluoxetine or other SSRIs to enhance motor recovery is not well established. (B)<br><br>The effectiveness of levodopa to enhance motor recovery is not well established. (B)<br><br>The use of dextroamphetamine or methylphenidate to facilitate motor recovery is not recommended. (B) |

# Evidence Tables

## Physiotherapy Approaches

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
|---|---|---|---|---|---|
| **Todhunter-Brown et al. 2014**<br><br>**UK**<br><br>**Cochrane Review** | 80% of trials were at low or unclear risk of bias across 7 domains assessed. | 96 RCTs including 10,401 persons recovering from stroke. Time since stroke was <30 days in 38 trials, <90 days in 12 trials, <6 months in 8 trials, <12 months in 3 trials and >12 months in 10 trials. | Trials examined physical rehabilitation approaches that were aimed at promoting recovery of postural control (balance during maintenance of a posture, restoration of a posture or movement between postures) and lower limb function (including gait), as well as interventions that had a more generalized stated aim, such as improving functional ability. Examples of approaches included Brunnström, Bobath and Johnstone.<br><br>Three groupings were explored: intervention vs. no treatment (41 studies), intervention vs. usual care or attention control (22 studies), and one intervention vs. another (13 studies).<br><br>The duration of the intervention was ≤28 days in 35 trials, ≤12 weeks in 24 trials, between 12 weeks and 6 months in 16 trials, and >6 months in 3 trials. | **Primary outcomes:** Independence in Activities of daily living (e.g., FIM, Barthel Activities of Daily Living Index, Modified Rankin Scale, and motor function (e.g., FMA-LE, Motor assessment scale, Rivermead mobility index, Rivermead Motor Assessment)<br><br>**Secondary Outcomes:** Balance and gait velocity. | *Physiotherapy interventions vs. no treatment*<br>Physiotherapy was associated with significant improvement in independence in ADLs after treatment (SMD=0.78, 95% CI 0.58 to 0.97; 27 trials included. GRADE: moderate certainty) and at follow-up (SMD=0.58, 95% CI 0.11 to 1.04; 9 trials. GRADE: moderate certainty).<br><br>Physiotherapy was associated with significant improvement in motor function, after treatment (SMD =0.81, 95% CI 0.58 to 1.04; 25 trials included. GRADE moderate certainty) and at follow-up (SMD=1.06, 95% CI 0.37 to 1.75; 8 trials. GRADE: moderate certainty)<br><br>Physiotherapy was not associated with significant improvements in balance or gait velocity.<br><br>*Physiotherapy interventions vs. usual care or attention control*<br>Physiotherapy was not associated with significant improvement in independence in ADLs after treatment after treatment (SMD=0.04, 95% CI -0.27 to 0.35; 6 trials. GRADE: moderate).<br><br>Physiotherapy was associated with significant improvement in motor function, after treatment (SMD =0.42, 95% CI 0.24 to 0.61; 13 trials included. GRADE moderate certainty), but not at follow-up (SMD=-0.106, 95% CI -0.42 to 0.23; 3 trials. GRADE: low certainty).<br><br>Physiotherapy was associated with significant improvements in balance and gait velocity. |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | | | *Physiotherapy intervention containing functional task training, neurophysiological or musculoskeletal components vs. physiotherapy intervention that does not contain the same category of treatment components.*<br><br>Physiotherapy interventions were not associated with significant improvements in the primary or secondary outcomes compared with the control group, based on the data from 3 to 8 trials. GRADE: low to moderate certainty<br><br>The authors concluded that "*no one physical rehabilitation approach was more (or less) effective than any other approach for increasing motor function.*" |
| **Van Vliet et al. 2005**<br><br>**UK**<br><br>**RCT** | CA: ☒<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT:☒ | 120 patients admitted for stroke rehabilitation within 2 weeks of event. Mean age was 74 years, 50% were men. | Patients were randomized 1:1 to receive rehabilitation based on either Bobath or motor relearning approach. Treatment was provided for as long as needed, on an outpatient basis.<br><br>No details regarding the content of the treatment programs are provided. Therapy was based on written guidelines consisting of theoretical concepts and clinical objectives. | **Primary Outcomes:**<br>Rivermead Motor Assessment (RMA), Motor Assessment Scale (MAS)<br><br>**Secondary Outcomes:**<br>6MWT, Modified Ashworth Scale BI, Extended Activities of Daily Living, Nottingham Sensory Assessment<br><br>Outcomes were assessed at 1, 3 and 6 months after randomization | Median RMA (gross function) at baseline and 6 months: Bobath 2 to 8 vs. Motor relearning 1 to 8, p=0.61<br><br>Median RMA (leg & trunk) at baseline and 6 months: Bobath 4 to 7 vs. Motor relearning 2 to 7, p=0.41<br><br>Median MAS (balanced sitting): at baseline and 6 months: Bobath 5 to5 vs. Motor relearning 4 to 25 p=0.25<br><br>Median MAS (supine to sitting) at baseline and 6 months: Bobath 4 to 6 vs. Motor relearning 2 to 6, p=0.00067<br><br>Median MAS (walking) at baseline and 6 months: Bobath 0 to 4 vs. Motor relearning 0 to 3, p=0.27<br><br>Median BI scores at baseline and 6 months: Bobath 8 to 18 vs. Motor relearning 8 to 17, p=0.20<br><br>Median 6MWT (m/s) at baseline and 6 months: Bobath 0.66 to 0.76 vs. Motor relearning 0.60 to |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | | | 0.64, p=0.54.<br><br>Adverse events: No reporting<br><br>Dropouts: Bobath group n=15, Motor learning group n=5 |

## Task Oriented Training (Task-Specific Training)

| Study/Type | Quality Rating | Sample Descript ion | Method | Outcomes | Key Findings and Recommendations |
|---|---|---|---|---|---|
| **English et al. 2017**<br><br>**Australia**<br><br>**Cochrane review** | The risk of bias was low in 6/6 domains assessed in 2 trials, using the Cochrane tool | 17 RCTs including 1,297 persons recovering from stroke living in the community or receiving inpatient rehabilitation. Most people could walk 10 metres without assistance. Mean age ranged from 54.2 to 71.7 years. Time since stroke was <1 month (n=3 trials), <3 months (n=3), <6 months (n=1), <1 year (n=1) and >1 year (n=8) | Trials compared circuit class training (minimum of 3 clients) provided for a minimum of once-weekly CCT sessions for a minimum of four weeks, with no therapy, sham therapy, or another therapy modality. 3 trials were based in-hospital and 14 were community based. Only studies that reported interventions with a focus on repetitive (within session) practice of functional tasks arranged in a circuit, with the aim of improving mobility, were included. | **Primary Outcomes:** 6-minute walk test (6MWT)<br><br>**Secondary Outcomes:** Walking speed, Timed up and go Test (TUG), Rivermead Mobility Index, Berg Balance Scale (BBS), Functional Reach Test, lower limb strength, range of motion, activities of daily living, Health related quality of life. | Compared with any other intervention, circuit class training was associated with a significant increase in distanced walked (m) in the 6MWT (MD=60.86, 95% CI 44.55 to 77.17; 10 trials included). GRADE: moderate certainty<br><br>Circuit class training was associated with a significant increase in gait speed (MD=0.15 m/s, 95% CI 0.10 to 0.19; 8 trials included); GRADE: moderate certainty<br><br>Circuit class training was associated with a significant improvement in TUG (MD= -3.62 seconds, 95% CI -6.09 to -1.16; 5 trials included). GRADE: low certainty<br><br>Circuit class training was associated with significant higher odds of independence in mobility, assessed using the Functional ambulation classification (OR=1.19, 95% CI 1.01 to 3.60; 3 trials included). GRADE: moderate certainty. |
| **French et al. 2016**<br><br>**UK**<br><br>**Cochrane** | In 23 trials, risk of bias was assessed as low or unclear in | 33 RCTs including 1,853 participants with stroke. Mean ages ranged from 50 to 79 years. The percentage of men ranged from 43% to 70%. | One arm of the trial had to include a repetitive task-training (RTT) intervention whereby an active motor sequence was performed repetitively within a single | **Primary Outcomes: (lower limb)** Walking distance, walking speed, functional ambulation, Timed Up and Go | Compared with usual care, RTT was associated with significant increase in walking distance assessed using the 6MWT (MD=34.80 m, 95% CI 18.19 to 51.41; 9 trials included). GRADE: moderate |

| Study/Type | Quality Rating | Sample Descript ion | Method | Outcomes | Key Findings and Recommendations |
|---|---|---|---|---|---|
| **review** | 5/5 domains assessed using the Cochrane tool | 2 trials compared upper limb with lover limb training, 6 trials evaluated upper limb training, and 17 trials evaluated lower limb training.<br><br>Mean time since stroke onset:<br>≤1mo: 10 trials<br>1-3mo: 5 trials<br>3-6mo: 4 trials<br>6-12mo: 5 trials<br>Chronic phase: 9 trials | training session, and where the practice was aimed towards a clear functional goal.<br>Comparisons:<br>Intervention vs attention control (i.e. recreation or cognitive therapy, educational sessions, splint control light massage, sham sitting protocol, comparison training program for upper or lower limb), and<br>vs. usual care.<br><br>Duration of training:<br>2-4wk: 19 trials<br>4-12wk: 8 trials<br>12-20wk: 4 trials<br>Inpatient rehabilitation: 2 trials | Test/sit-to-stand; measures of lower limb function (e.g., Rivermead Motor Assessment,) Stroke Impact Scale - mobility domain, standing balance/reach (e.g., Berg Balance Scale)<br><br>**Secondary Outcomes:**<br>ADL, global motor function, measures of quality of life, adverse events.<br><br>Outcomes were assessed at post-intervention and at follow-up. | RTT was not associated with significant increase in walking speed (SMD=0.39 m/s, 95% CI -0.02 to 0.79, p=0.061; 12 trials included). GRADE: low certainty<br><br>RTT was not associated with significant improvement in functional ambulation (SMD=0.35, 95% CI 0.04 o 0.66; 8 trials included). GRADE: moderate certainty<br><br>RTT was not associated with significant improvement in lower limb functional measures (SMD=0.29, 95% CI 0.10 to 0.48; 5 trials included). GRADE: low certainty. The effect size was larger when follow-up was conducted <6 months following stroke (SMD=0.34, 95% CI 0.16 to 0.53) compared with 6 to 12 month post stroke (SMD=0.06, 95% CI -0.18 to 0.31).<br><br>Effect size for lower-limb function was not affected significantly by dose. (0 to 20 hours, SMD=0.39, 95% CI 0.07 to 0.71 vs. >20 hours, SMD=0.33, 95% CI 0.16, 0.50)<br><br>The number of falls and other serious and non-serious adverse events (e.g. arrhythmias) were measured in only 4 trials. |
| **Renner et al. 2016**<br><br>**Netherlands**<br><br>**RCT** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☑ | 73 patients, recruited from a, inpatient rehabilitation unit following first-ever stroke with stroke who were able to sit and stand independently, and walk with assistance. Median age was 55 years, 71% were men. Mean time since stroke was 35 days. | Patients were randomized to Group 1, which received group task training or to Group 2, which received individual task training. The training was provided for 90 minutes over 6 weeks (total of 30 sessions). | **Primary Outcomes:**<br>Stroke Impact Scale (SIS), 6 Minute Walk Test (6MWT), Timed Up and Go test (TUG), Chair stand-up test, Modified stairs test, Hospital Anxiety and Depression Scale.<br><br>Outcomes were assessed at baseline, 6wk, and 24wk. | There were no significant differences in mean change scores (from baseline to 6 weeks) between groups for the SIS mobility domain (13.6 vs. 14.3).<br><br>There were no significant differences in mean change scores between groups for any of the other outcomes, except for significantly greater decrease in the time to complete modified chair test, in which the Group 2 patients performed better (-13.9 sec vs. 6.1, p=0.03).<br><br>The authors conclude that group task-specific training may be as effective as individual training. |

| Study/Type | Quality Rating | Sample Descript ion | Method | Outcomes | Key Findings and Recommendations |
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| **van de Port et al. 2012**<br><br>**The Netherlands**<br><br>**RCT** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☑ | 250 patients who had completed inpatient rehabilitation following stroke, were able to walk 10 m without physical assistance and were to be discharged home, with the intention of participating in an outpatient rehabilitation program. Median age was 57 years, 65% were men. Mean time since stroke was not reported. | Patients were randomized to receive a graded task specific circuit training program (n=126) or usual outpatient physiotherapy. Circuit training involved 8 workstations designed to improve walking ability and consisted of 90-minute sessions, 2/week over 12 weeks. Subjects in the control group received usual outpatient physiotherapy. | **Primary outcome:**<br>Mobility sub scale of the Stroke Impact Scale (SIS)<br><br>**Secondary outcomes:**<br>Other domains of the SIS, Rivermead Mobility Index, Falls Efficacy Scale, Nottingham Extended Activities of Daily Living, Hospital Anxiety and Depression Scale, Fatigue Severity Scale, Motricity Index, 6MWT, Functional Ambulation Categories, TUG, 5 m comfortable walking speed, modified stairs test)<br><br>Primary outcome was assessed at baseline, 6, 12, 18 and 24 weeks post randomization. Secondary outcomes were assessed at baseline, 12 and 24 weeks. | Mean ± SD SIS (mobility) scores at baseline, 12 weeks and 24 weeks<br>Circuit training group: 80.9 ± 13.04 to 87.27 ± 12.38 to 86.56 ± 13.19<br>Control group: 77.8 ± 15.0 to 83.73 ± 13.25 to 84.42 ± 14.48<br>p<0.001 (baseline to 24 weeks)<br><br>Mean ± SD RMI scores at baseline, 12 weeks and 24 weeks<br>Circuit training group: 12.67 ± 1.58 to 13.47 ± 11.44 to 13.50 ± 1.42<br>Control group: 12.35 ± 2.00 to 12.82 ± 1.90 to 13.03 ± 1.82<br>p<0.001 (baseline to 24 weeks)<br><br>Mean ± SD 6MWT (s) at baseline, 12 weeks and 24 weeks<br>Circuit training group: 339 ± 120 to 412 ± 117 to 416 ± 118<br>Control group: 306 ± 135 to 1354 ± 145 to 1366 ± 151<br>p<0.001 (baseline to 24 weeks)<br><br>Dropouts: circuit training group n=1, control group n=7<br><br>Adverse events: falls (n=29, circuit training group, n=26, control group). 2 serious adverse events were reported by 2 subjects in the circuit training group. |
| **Salbach et al. 2004, 2005**<br><br>**Canada**<br><br>**RCT** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☑ | 91 participants living in the community with a residual walking deficit within one year of a first or recurrent stroke. Mean age was 71 years, 57% were men. Mean time since stroke was 227 days. | Participants were randomized to a hospital-based intervention group which comprised 10 functional tasks designed to strengthen the lower extremities and enhance walking balance, speed and distance or to a control intervention focusing on upper | **Primary outcome:**<br>6MWT, Activities-specific Balance Confidence (ABC) scale<br><br>**Secondary outcomes:**<br>5-m walk (comfortable and maximum pace), Berg Balance Scale | Mean ± SD scores before and after treatment for the walking training group and the upper extremity training groups were:<br><br>6MWT (m): 209 ± 126 to 249 ± 136 vs. 204± 131 to 209 ±132, p<0.05<br><br>Comfortable walking speed (m/s): 0.64 ± 0.33 to 0.78 ±0.40 vs. 0.61 ± 0.37 to 0.64 ± 0.37, p<0.05 |

| Study/Type | Quality Rating | Sample Descript ion | Method | Outcomes | Key Findings and Recommendations |
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| | | | extremity activities.<br><br>Therapy was provided 3x/week for 6 weeks (18 sessions) | (BBS) and Timed 'Up and Go' (TUG) test<br><br>Outcomes were assessed before and after treatment | Maximum walking speed (m/s): 0.79 ± 0.45 to 0.99 ± 0.56 vs. 0.81 ± 0.49 to 0.81 ± 0.49, p<0.05<br><br>TUG (s): 24.4 ± 18.8 to 23.2 ± 20.6 vs. 25.5 ± 21.7 to 27.1 ± 27.1, p=ns<br><br>BBS: 42 ± 11 to 44 ± 11 vs. 40 ± 13 to 41 ± 13, p=0.854<br><br>Mean ± SD Δ in scores from baseline to end of treatment for walking training and upper extremity training groups were:<br>ABC scale: 8.2 ± 18.6 vs. 0.6 ± 13.7, p<0.05 Effect size=0.40<br><br>Dropouts: intervention group n=3, control group n=4<br><br>Adverse events: 6 falls in total were reported, none resulting in serious injury |

## Treadmill Training +/- Body-weight Support

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| **Brauer et al. 2022**<br><br>**Australia**<br><br>**RCT**<br>***IMproving Physical ACtivity after stroke via Treadmill training (IMPACT)*** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☑ | 119 persons recruited from 6 centres, undergoing rehabilitation following stroke, who were able to walk independently. Mean age was 63 years, 79% were men. Mean time since stroke was 28 days. | Participants were randomized to an experimental group, which undertook treadmill training (40–60% heart rate reserve) and self-management education for 30 min, three times a week for 8 weeks vs. a control group undertook the same amount of usual gait training | **Primary outcomes:**<br>Steps/day<br><br>**Secondary outcomes:**<br>Walking ability, cardiorespiratory fitness, cardiovascular risk, depression, self-efficacy, perception of physical activity, participation, and quality of life.<br><br>Assessments were | At 8 weeks, persons in the experimental group took significant more step/day (6982 vs. 5746, mean difference=1,436, 95% CI 229 to 2643).<br><br>By 6 months, the difference in mean steps/day was no longer significant (6696 vs. 5,824; mean change= 871, 95% CI −385 to 2129).<br><br>At both 8 weeks and 6 months, there were no significant differences between groups in the walking measures (10- m walk test [preferred and fast gait speed] 6MWT), cardiorespiratory fitness (VO2 peak (mL/kg/min), or any of the other |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | | conducted before and after the intervention and at 6 months | secondary outcomes. |
| **Nascimento et al. 2021**<br><br>**Brazil**<br><br>**Systematic review & meta-analysis** | PEDro scores ranged from 4 to 8 | 16 RCTs including 713 participants who were able to walk independently +/- a walking aid (i.e FAC ≥3) following stroke. Mean age ranged from 49 to 74 years. 4 trials were conducted in the acute and chronic phase, 1 in acute and chronic phases and 12 in the chronic phase. (Sex breakdown was not reported). | Trials compared mechanically assisted walking provided either by treadmill (n=14) or any other type of gait trainer (n=2), without body-weight support vs. no treatment (n=2), non-walking intervention (n=6) or active treatment (overground walking, n=9). Therapy was provided for 20-60 minutes, 2-5 x/week for an average of 10 weeks. | **Primary outcomes:**<br>Walking speed, distance walked | *Treadmill walking vs. no/nonwalking intervention*<br>At the end of the intervention period, treadmill walking was associated with significantly greater increase in walking speed (MD=0.13 m/s, 95% CI 0.08 to 0.19, 6 trials, n=266. Moderate quality evidence). Low quality evidence from 3 trials indicated the effect was durable at follow-up.<br><br>Treadmill walking was associated with significantly greater increase in distance walked (MD= 46 m, 95% CI 24 to 68, 6 trials, n=235. Moderate -quality evidence). The effect was durable at follow-up.<br><br>*Treadmill training vs. overground walking*<br>At the end of the intervention period, treadmill walking was associated with similar increases in walking speed (MD=0.07 m/s, 95% CI 0.00 to 0.13, 6 trials, n=196. Moderate quality evidence).<br><br>Treadmill walking was associated with similar gains in distance walked (MD=18 m, 95% CI 1 to 36, 6 trials, n=210. Moderate -quality evidence). |
| **Baer et al. 2017**<br><br>**UK**<br><br>**RCT** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☒ | 77 patients recruited from 4 stroke units an average of 41 days following stroke. Mean age was 73 years, 52% were men. | Participants were randomized 1:1 to treadmill training (minimum twice weekly) plus normal gait re-education or normal gait re-education only (control) for up to eight weeks. | **Primary Outcomes:**<br>Rivermead mobility Index (RMI)<br><br>**Secondary Outcomes:**<br>Functional ambulation category (FAC), Timed up and go Test (TUG), confidence in walking (VAS), 10-meter walk test (10MWT), gait speed, 6-minute walk test (6MWT), Barthel index (BI), Motor Assessment Scale | There were no significant between-group differences post-intervention, or at 6-month follow-up on any of the outcome measures. |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | | (MAS), Stroke Impact Scale (SIS). | |
| **Mehrholz et al. 2017**<br><br>**Germany**<br><br>**Cochrane review** | There was a low risk of bias in all domains assessed (random sequence generation, concealed allocation and blinding of outcome assessors) in 15 trials | 56 RCTs including 3,105 participants with some walking difficulties following stroke; some persons could not walk without assistance. Participants were recruited from inpatient and outpatient settings. Mean age was 60 years. Time since stroke ranged from 28 days to <5 years. | 26 trials compared treadmill training with body weight support to another physiotherapy intervention; 20 trials compared treadmill training without body weight support to another physiotherapy intervention, no intervention or sham intervention; 2 trials compared treadmill training with body weight support to treadmill training without body weight support and 4 trials did not state whether they used body weight support or not. No studies compared body weight support without treadmill training to another physiotherapy intervention. | **Primary Outcomes:** Walking ability (independence, gait speed, endurance)<br><br>**Secondary Outcomes:** Activities of daily living measures | *Treadmill training +/- body weight support vs other interventions*<br><br>Treadmill training did not increase the chances of walking independently (risk difference [RD] -0.00, 95% CI -0.02 to 0.02; 18 trials) GRADE: low certainty.<br><br>Treadmill training was associated with a significant increase in walking speed at the end of treatment (MD=0.06 m/s, 95% CI 0.03 to 0.09; 47 trials included). GRADE: moderate certainty<br>The increase in speed was greater among persons who were independent in walking at the start of treatment vs. those who were dependent. However, at the end of follow-up, the advantage of treadmill training was lost (MD=0.03 m/s, 95% CI -0.05 to 0.10; 12 trials included). GRADE: low certainty<br><br>Treadmill training was associated with a significant increase in walking endurance at end of treatment (MD=14.19 meters, 95% CI 2.92 to 25.46; 28 trials included). GRADE: moderate certainty<br>The improvement was greater among persons who were independent in walking at the start of treatment vs. those who were dependent. However, at the end of follow-up, the advantage of treadmill training was lost (MD=21.64 meters (95% CI -4.70 to 47.98; 10 trials GRADE: low certainty |
| **DePaul et al. 2015**<br><br>**Canada**<br><br>**RCT** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☑ | 71 participants living in the community following stroke who were able to walk 10 m without assistance (gait aid allowed). Mean age was 67.3 years, 60% were men. Mean time since stroke was 20.9 weeks. | Participants were randomized to receive a motor-learning-science–based overground walking training program or body-weight-supported treadmill training (BWSTT). Participants assigned to the Motor Learning Walking Program (MLWP) practiced | **Primary Outcomes:** Comfortable gait speed by 5-m walk test.<br><br>**Secondary Outcomes:** 6-Minute Walk Test, Functional Balance Test (FBT), Activities-specific Balance Confidence | While there was significant improvement in comfortable gait speed within the study groups at T2, there was no significant between-group difference in at T2. Mean between-group difference was 0.002 m/s (95% CI = −0.112 to 0.117).<br><br>There were no significant between-group differences in any of the secondary outcome measures at T2 or T3. |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | various overground walking tasks under the supervision of a physiotherapist. The BWSTT program emphasized repetition of the normal gait cycle while supported on a treadmill and assisted by therapists.<br><br>Both groups were offered 15, 1-hours sessions over 5 weeks in an outpatient clinic setting. | Scale, modified Functional Ambulation Categories, Stroke Impact Scale<br><br>All outcomes were measured within 1 week prior to initiating training (T1), within 1 week following completion of training (T2), and 2 months after training (T3) | |
| **Ada et al. 2013**<br><br>**AMBULATE trial**<br><br>**Australia**<br><br>**RCT** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☑ | 102 community-dwelling individuals who had been discharged from formal rehabilitation, who were living in the community and walked slowly (defined as being able to walk 10 m across flat ground in bare feet without any aids taking >9 seconds). Mean duration since stroke ranged from 19 to 22 months, across study groups. Mean ages in the 3 study groups were 70, 64 and 63 years, 70% were men. Mean time since stroke was 20 months. | Participants were randomized to one of 3 groups: 1) 30 min of treadmill and overground walking 3x/week for four-months, 2) same intervention as group 1, but was provided for 2 months and 3) a control group that received no intervention | **Primary Outcomes**: 6MWT, 10m walk test<br><br>**Secondary Outcomes**: EuroQol (EQ-5D-3L), Adelaide Activities Profile, Walking Self-Efficacy Scale<br><br>Assessments were conducted at baseline, 2, 4, 6 and 12 months | At 2 and 4 months, participants in the 4-month training group walking further in the 6MWT than the control group; however, at 12 months, the 4-month training group was not walking further than the control (MD= 9m; 95% CI -27 to 47).<br><br>The 2-month training group out walked the control at 2 months but not at 4 months (MD= 9m, 95% CI -13 to 31).<br><br>No improvements in walking speed in the 4-month training group compared to the control remained at 12 months.<br><br>No between group differences were shown in terms of improvement on the EuroQol, Adelaide Activities Profile or the Walking Self-Efficacy Scale. |
| **Nadeau et al. 2013**<br><br>**USA**<br><br>**RCT *Locomotor*** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☑ | 408 patients recruited from one of 6 inpatient rehabilitation centres, within 45 days of stroke with residual paresis in the lower extremity, ability to walk 10 feet | Patients were randomized to one of 3 programs: 1) Locomotor training program (LTP; n=139), 2) Home exercise program (HEP; n=126), or 3) Usual Care (UC; n=143). | **Primary Outcome:** Improvement in functional level of walking at 6 months<br><br>**Secondary Outcomes:** Other walking measures | Mean time from stroke to randomization was 63.8 days.<br><br>At 6 months, 50.4% of LTP, 49.2% of HEP, and 32.2% of UC patients had improved to a higher functional walking level. |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| ***Experience Applied Post Stroke (LEAPS)*** | | with no more than 1-person assistance, a self-selected 10-m walking speed <0.8 m/s and living in the community. Mean age was 62 years, 55% were men. | 1) LTP: 20–30min at 3.2km/hr of treadmill training with partial body weight support and 15min walking program.<br><br>2) HEP: flexibility, range of motion, strength, coordination and balance exercises were provided by a physical therapist in the pat9ient's home.<br><br>Both LTP and HEP programs were of similar duration and intensity (90-minute sessions, 3 times/week) for 12-16 weeks, for a total of 30 to 36 exercise sessions. | (walking speed during 10m walk, 6-minute walk distance, number of steps taken per day), Fugl-Meyer, Berg Balance Scale (BBS), Activities-specific balance confidence (ABC), Instrumental ADLs (IADL), Stroke Impact Scale (SIS), and mRS | Compared with the UC group, the odds of achieving a higher walking level, were greater in the HEP group (OR=2.04, 95% CI 1.22–3.42; p=0.007). There were no significant differences between the LTP and HEP groups.<br><br>Patients in all 3 groups had significantly improved their walking speed, performance on the 6-minute walk distance, and number of community steps taken/day. The improvements in the LTP and HEP group were significantly greater compared with UC (p<0.0001).<br><br>Compared with the UC group, patients in the HEP group showed significantly greater improvement in BBS score, ABC Scale score, and physical mobility (p < 0.0014).<br><br>There were 11 losses to follow-up in the LTP group, 6 in the HEP group and 7 in the UC group. |
| **Duncan et al. 2011**<br><br>**USA**<br><br>**RCT**<br>***Locomotor Experience Applied Post Stroke Trial (LEAPS)*** | CA: ☑<br><br>Blinding: Patient Assessor ☑<br><br>ITT: ☑ | 408 patients with stroke onset of 2 months, who were able to walk 3 m with maximum of one person assist, able to follow 3-step commands, capable of self-selected walking speed of <0.8 sec over 10 m, residing in the community. Mean age was 62 years, 55% were men. Mean time from stroke to randomization was 60 days. | Patients were randomized to undergo one of 3 training regimens: 1) early treadmill training with partial body-weight support (within 2 months of stroke) (n=139), 2) late treadmill training with partial body-weight support (6 months after stroke) (n=143) and 3) home-based exercise program (n=126).<br><br>All programs consisted of 90 min sessions, provided 3x/week, for 12 to 16 weeks. | **Primary outcome:**<br>The proportion of patients with improved level of functional walking, defined as the ability to walk independently at a speed of >0.4 m/s (severe impairment at baseline) or >0.8 m/s (moderate baseline impairment) at 1 year.<br><br>**Secondary outcomes:**<br>Gait speed, Fugl-Meyer Assessment, BBS, activities of daily living and items on the Stroke Impact Scale. | At one-year, 52% of all patients had improved functional walking ability. There was no difference in the proportion of improvement found among the 3 groups. The adjusted ORs for improving level of walking were:<br>Early group vs. home group OR=0.83, 95% CI 0.50 to 1.39<br>Late group vs. home group OR=1.19, 95% CI 0.72 to 1.99<br><br>There were no significant differences between the groups on any of the secondary outcomes at 12 months.<br>Mean ± sd Δ in comfortable walking speed (m/s):<br>Early: 0.23±0.20, Late: 0.24±0.23, home: 0.25±0.22<br><br>Mean ± sd Δ in distance walked in 6 min (m):<br>Early: 73.2±69.4, Late: 79.0±75.1, Home:85.2±72.9 |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | | Outcomes were assessed at baseline, 6 and 12 months. | Adverse events:<br>Any serious event: n=191 (no significant differences among groups)<br>Falls n=139 (no significant differences among groups)<br><br>Dropouts: intervention was not completed by 13% of participants in the early group, 17% in late group and 3% in home-exercise group. |
| **Ada et al. 2010**<br>**Dean et al. 2010**<br>**The MOBILISE Trial**<br><br>**Australia**<br><br>**RCT** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☑ | 126 participants who were nonambulatory following stroke. Mean age was 70 years, 56% were men. Mean time since stroke was 18 days. | Participants were randomized to an experimental (n=64) or a control group (n=62) and received treatment until they achieved independent walking or for as long as they remained in hospital. Subjects in both groups received 30 minutes of walking practice 5 days/week. Additional lower-limb therapy was provided for an additional 30 minutes/day. Participants in the experimental group undertook up to 30 minutes per day of treadmill walking with sufficient body weight support such that initially, the knee was within 15 degrees of extension in mid stance. Participants the control group received up to 30 minutes of overground walking training, with the use of aides, if required. | **Primary outcome:**<br>The proportion of participants who achieved independent walking (ability to walk 15 m continuously across flat ground) at 6 months.<br><br>**Secondary outcomes:**<br>Gait speed, stride length, 6MWT, falls<br><br>Outcomes were assessed at baseline and 6 months | At 6 months 43/59 (71%) participants in the experimental group were independent ambulators compared with 36/60 (60%) participants in the control group. The proportion of participants who were independent ambulators at months 1, 2 and 6 was not significantly different between groups (p=0.13). Participants in the experimental group achieved independence in ambulation a median of 14 days earlier.<br><br>At 6 months from baseline the mean ± sd outcomes of independent ambulators in the experimental and control groups were:<br>Walking speed (m/sec): 0.57 ± 0.36 vs. 0.47 ± 0.28, p=ns<br>Walking stride (cm): 73 ± 31 vs. 67 ± 24, p=ns<br>6MWT (m): 240 ± 130 vs. 183 ±99, Δ 1.0, 95% CI 0.1 to 1.9, p<0.05.<br>No. of fallers 61% vs. 51%, p=ns<br><br>Dropouts/losses to follow up: n=7 (experimental group n=5, control group n=2)<br><br>Adverse events: 2 participants in the control group experienced anxiety related to the treatment and withdrew from the study. There were 47 reports of adverse events in the experimental group and 27 reports in the control group, none of which were attributed to the treatment. |

## Electromechanical Gait Training Devices

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| **Calafiore et al. 2022**<br><br>**Italy**<br><br>**Systematic review & meta-analysis** | PEDro scores ranged from 5 to 8/10. | 14 RCTs including 576 persons recovering from stroke with onset < 6 months. Mean age ranged from 50.0 to 76.8 years.50 Mean time from stroke onset ranged from 16 and 140 days. | Trials compared treatment with robotic devices (Lokomat, n=9; Hybrid Assistive Limb-HAL, n=3; Ekso, n=1 and Walkbot, n=1) +/- conventional rehabilitation vs. conventional rehabilitation.<br><br>The duration of robotic rehabilitation varied from 2 to 8 weeks, providing a total of with the duration of the interventions ranging from a total of 4 to 30 hours of therapy. | **Primary Outcomes:**<br>Functional ambulation category (FAC) | Robotic gait training was not associated with a significant improvement in FAC (MD=-0.09, 95% CI -0.22.to 0.03; 6 trials included). |
| **Molteni et al. 2021**<br><br>**Italy**<br><br>**RCT**<br>***Stroke Rehabilitation with Exoskeleton-assisted Gait. (EKSOGAIT)*** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☒ | 75 patients with first-ever stroke, with moderate lower-limb spasticity and limited ambulation capacity. Mean age was significantly lower in the experimental group (62 vs. 68 years), 56% were men. Mean time since stroke was 35 days. | All patients participated in 120 minutes of daily conventional rehabilitation, 6 days a week.<br><br>Patients were also randomized to an experimental group and received 15 sessions (60 minutes each, 5 days/week for 3 weeks) with the Ekso™ device or the same amount of conventional gait training (control group). | **Primary outcome:**<br>6 Minutes Walking Test (6MWT)<br><br>**Secondary outcomes:**<br>10 Meter Walk Test (10MWT), Timed Up and Go (TUG), Trunk Control Test (TCT), Motricity Index (MI), Functional Ambulation Classification (FAC)<br><br>Assessments were conducted before and after treatment | There was no significant difference between groups in the primary outcome. The mean distance walked increased from 48.60 meters to 139.24 m (T2) in the experimental group and from 44.29 meters to 149.43 in the control group.<br><br>There was significant improvement within groups for the secondary outcomes with no between group differences. |
| **Mehrholz et al. 2020**<br><br>**Germany**<br><br>**Cochrane review** | 36 trials were at low risk of bias for sequence generation, 32 were at low risk of | 62 trials including 2,440 participants with difficulty walking following a stroke. Mean age ranged from 47 to 76 years. Approximately 65% were men. 40 trials included | Trials evaluated electromechanical- and robotic-assisted gait training (Lokomat, n=25; Gait Trainer n=9) plus physiotherapy vs. physiotherapy (or usual care) for regaining and | **Primary Outcomes:**<br>Ability to walk independently<br><br>**Secondary Outcomes:**<br>Measures of activity limitations (walking | The odds of becoming independent in ambulation at the end of the intervention were significantly higher in the experimental group (OR=2.01, 95% CI 1.51 to 2.69; 38 trials). GRADE: high certainty However, the benefit was lost at the end of follow-up, which averaged 22.3 weeks (OR=1.93, 95% CI 0.72 to 5.13; 6 trials). GRADE: low certainty |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | bias for CA, 28 trials blinded the outcome assessor, 26 were at low risk of bias for incomplete outcome data and all but 2 trials were at unclear risk of bias for selective reporting | participants who could walk independently at the start of the study; 4 trials included participants who were dependent and independent walkers; and18 studies included only non-ambulatory participants. | improving walking after stroke.<br><br>The duration of study interventions ranged from 10 days to 8 weeks. In most trials the study intervention period was 3-4 weeks. Frequency ranged from 2-7 days a week, provided for 20-60 minutes/session | speed, walking capacity)<br><br>Outcomes were evaluated at postintervention and at follow-up | At the end of the intervention, walking speed was significantly faster in the experimental group (MD=0.06 m/s, 95% CI 0.02 to 0.1; 42 trials). GRADE: low certainty<br>However, the benefit was lost at the end of follow-up, which averaged 19 weeks (MD=0.07 m/s, 95% CI - 0.03 to 0.17; 13 trials). GRADE: low certainty<br><br>At neither the end of the intervention, nor at follow-up (mean of 18 weeks), was walking capacity (distance walked in 6 minutes) significantly improved in the experimental group (MD=10.86 meters, 95% CI -5.72 to 27.44; 24 trials and MD=7.76 meters, 95% CI -21.47 to 36.99; 11 trials). GRADE: moderate |
| **Wall et al. 2020**<br><br>**Sweden**<br><br>**RCT** | CA: ☒<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☒ | 36 patients admitted for inpatient rehabilitation who were unable to walk or needed continuous manual support to walk due to lower extremity paresis. Mean age was 51 years, 69% were men. Mean time since stroke was 34 days. | Patients were randomized 1:1 to receive training with the Hybrid Assistive Limb (HAL), 4 days/week for 4 weeks (up to 90 minutes/session) or conventional physiotherapy (60 minutes sessions) | **Primary outcome:**<br>Functional Ambulation Categories (FAC) score<br><br>**Secondary outcomes:**<br>Fugl-Meyer lower extremity (FMA-LE Motor) the 2-Minute Walk Test at self-preferred speed (2MWT), the Bergs Balance Scale (BBS) and the Barthel Index (BI)<br><br>Assessments were conducted at baseline (T1), post intervention (T2) and at 6 months post stroke (T3). | While patients in both groups improved over time, there was no significant difference between-groups in the proportion of patients with independent walking (FAC<4) at T2 or T3.<br><br>At 6 months, independent predictors of independence in ambulation were younger age and less severe stroke. Training with the HAL device was not an independent predictor (OR=0.818, 95% CI 0.179–3.744). At 6 months, 2/3 of all patients were independent in walking.<br><br>While patients in both groups improved over time, there was no significant difference between-groups in any of the secondary outcomes. |
| **Han et al. 2016** | CA: ☒<br><br>Blinding: | 60 patients recruited from a stroke rehabilitation unit <3 months after first- | Patients were randomized to receive 30 minutes of robot-assisted gait therapy, using | **Primary Outcomes:**<br>Brachial–ankle pulse wave velocity (baPWV) | Both groups showed significant improvement in the MBI, BBS, FAC, and FMA-LE over time (p≤0.001). |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| **South Korea**<br><br>**RCT** | Patient ☒<br>Assessor ☑<br><br>ITT: ☒ | ever stroke, who were dependent in ambulation with severe gait impairment. Mean age was 65 years, 53% were men. Mean time since stroke was 20 days. | the Lokomat + 30 minutes of conventional rehabilitation therapy or 60 minutes of rehabilitation therapy. In both groups, therapy was provided 5 days/week x 4 weeks. | **Secondary Outcomes:** Functional Ambulation Category (FAC), Fugl Meyer Assessment (FMA-LL), modified Barthel Index (BI), Berg Balance Scale (BBS).<br><br>All assessments were performed at baseline and after the 4-week intervention. | There were no significant differences between the experimental group and control group in the BI, BBS, FAC, or FMA-LL. |
| **Van Nunen et al. 2015**<br><br>**Netherlands**<br><br>**RCT** | CA: ☒<br><br>Blinding:<br>Patient ☒<br>Assessor ☒<br><br>ITT: ☒ | 30 patients recovering from first ever stroke who were unable to walk completely independently. Mean age was 53 years, 50% were men. Mean time since stroke was 64 days. | Patients were randomized to a a conventional therapy group or a Lokomat + conventional therapy group.<br><br>The Lokomat + conventional therapy group received 2 hours of Lokomat therapy and 1.5 hours a week of conventional physical therapy (PT) aimed at recovery of walking ability, whereas the conventional therapy group underwent 3.5 h of PT. | **Primary Outcomes:** Walking speed (10m timed walk test).<br><br>**Secondary Outcomes:** Functional ambulation category (FAC), Berg Balance Scale (BBS), Motricity Index (MI), Burnnstrom-Fugl Meyer (FM), Rivermead Mobility Index (RMI), Timed Up and Go test (TUG).<br><br>All outcome measures were assessed before and after the intervention and at wk 24 and wk 36 after start of the intervention. | There were significant gains within groups in walking speed, other walking- and mobility related tests, and strength of the paretic knee extensors relative to baseline at all assessments, but no significant difference between groups at post-intervention, 10wk, or at follow-up (24 and 36wk) on walking speed, FAC, BBS, RMI, FM, or TUG. |
| **Kelley et al. 2013**<br><br>**USA** | CA: ☑<br><br>Blinding:<br>Patient ☑<br>Assessor ☑ | 20 patients who had received standard inpatient/outpatient rehabilitation following stroke with a NIHSS Lower Extremity | Participants were randomized to receive robotic-assisted body weight supported treadmill training using the Lokomat (n=11), or Overground Gait Training | **Primary Outcomes:** 10m Walk Test (10m WT), 6-minute walk distance (6 MWD).<br><br>**Secondary Outcomes:** | Time post-stroke differed significantly at baseline between the Lokomat (3.71 yrs) and the OGT (1.44yrs) groups (p=0.025)<br><br>No significant differences were seen between the Lokomat and OGT groups between baseline and |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| **RCT** | ITT: ☒ | motor score of 1–4 and could walk at least 10 m. Mean age was 66 years, 65% were men. Mean time since stroke was 2.87 years.<br><br>. | (OGT, n=9). Therapy was provided 1 hour a day, 5x/week for 8 weeks. | FMA-LE, Functional Independence Measure locomotion (FIM-L), Barthel Index, Stroke Impact Scale (SIS).<br><br>Measurements were taken at baseline, post-intervention, and 3 months post. | post-intervention, or between baseline and 3-month follow-up on the primary outcome measures, the FM-LE or Barthel Index. |

## High Intensity Step Training

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| **Thompson et al. 2024**<br><br>**USA**<br><br>**RCT**<br>***Promoting Recovery Optimization with Walking Exercise After Stroke (PROWALKS)*** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☑ | 250 patients recruited from 4 hospitals >6 months following stroke who were able to ambulate independently, with a self-selected walking speed of 0.3-1.0 m/s who were walking an average of <8,000 steps/day. Mean age was 63 years, 54% were men. Mean time since stroke was 45 months. | Patients were randomized to receive a high-intensity walking intervention (FAST), a step activity monitoring behavioral intervention (SAM), or a combined intervention (FAST+SAM). The program was provided for 12 weeks (2-3 sessions/week, for a total of 36 sessions).<br><br>FAST training consisted of walking-related activities at 70% to 80% heart rate reserve, patients in SAM received daily feedback and goal setting of walking activity (steps/day). | **Primary outcome:**<br>Steps/day (assessed using a Fitbit)<br><br>**Secondary outcomes:**<br>6MWT, self-selected walking speed (SSWS) and $VO_2$ consumption at ventilatory threshold (mL/kg per min)<br><br>Assessments were conducted at baseline and post intervention. | There were 20/89 dropouts in the FAST group, 13/81 in the SAM group and 17/80 in the combined group.<br><br>There was a nonsignificant improvement in the primary outcome from a mean of 3,959 steps/day to 4,365 (Δ 406 steps, 95% CI −63 to 876) in the FAST group.<br><br>There was a significant improvement in the primary outcome from a mean of 3,845 steps/day to 5,386 (Δ 1,542 steps, 95% CI 1,014 to 2,069) in the SAM group.<br><br>There was a significant improvement in the primary outcome from a mean of 3,768 steps/day to 5,075 (Δ 1,307 steps, 95% CI 752 to 1861) in the FAST+SAM group.<br><br>There were significant improvements in distance walked (6MWT) and SSWS in all groups, with no significant improvement in Vo2 consumption. |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | | | Only the FAST+SAM group achieved a clinically meaningful improvement in walking performance (steps/day) and in both measures of walking capacity (6MWT distance, SSWS). |
| **Mah et al. 2022**<br><br>**Singapore**<br><br>**Systematic review & meta-analysis** | There were some concerns with risk of bias in 4 trials, assessed using the RoB 2 tool.<br><br>PEDro scores were 5/10 (n=2), 7/10 (n=4) and 8/10 (n=1) | 7 RCTs including 944 participants with acute (<3 months) and sub-acute (3-6 months) stroke. | Trials compared the effect of high intensity exercise (HIE) vs. a control group receiving a physical therapy intervention of lower intensity or no specific intervention/usual care.<br><br>HIE was defined as achieving >60% of heart rate reserve (HRR) or VO2 peak, 70% of maximal heart rate (HRmax), or attaining a score of ≥14 on the rate of the perceived exertion Borg scale (6–20 rating scale) | **Primary Outcomes:**<br>6 min walk test (6MWT), gait speed, steps per day, Berg Balance scale (BBS) and the Barthel index (BI)<br><br>**Secondary Outcomes:**<br>Rate of Adverse Events | Three out of the four studies showed significant improvements in walking distance (6mwt) in the HIE group compared to the control group.<br><br>Three RCTs found significant improvements in gait speed in the group performing HIE compared to the control groups, which maintained at 3-6 months follow-up.<br><br>Out of 3 trials assessing BBS, in one trial scores were significantly higher in the HIE group.<br><br>Just one study examined steps per day and showed no significant difference between HIE and control groups. |
| **Klassen et al. 2020**<br><br>**Canada**<br><br>**RCT**<br>***Determining Optimal Post-Stroke Exercise (DOSE)*** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☒ | 75 patients recruited from 6 inpatient rehabilitation units, with difficulty walking following stroke with onset of <10 weeks. Mean age was 57 years, 59% were men.<br><br>Mean baseline 6MWT distances (m) were 129 (control group), 129 (DOSE 1 group) and 139 (DOSE 2 group). | Patients were randomized 1:1:1 to a control group that received usual care (physical therapy for 1 hour/day, 5x/week), or DOSE 1 group (same duration as control group, but double the intensity (target of >60% heart rate reserve at the end of the intervention), and a target of >2000 walking steps based on aerobic minutes and walking steps), or DOSE 2 group (2 hours, 5 days/week, with 4x the intensity of the control group). Wearable sensors were worn by members of all groups to track heart rate, steps etc. | **Primary outcomes:**<br>Walking endurance (6MWT) at the end of the intervention<br><br>**Secondary outcomes:**<br>Isometric quadriceps strength (paretic knee strength), 5-meter walk test, Berg Balance Scale (BBS), Patient Health Questionnaire-9 (PHQ-9) and EQ-5D-5 L, assessed at the end of the intervention and at 6 and 12 months. | *Post intervention*<br>Mean post intervention 6MWT distances (m) were 246 (control group), 307 (DOSE 1 group) and 315 (DOSE 2 group).<br><br>The mean distance walked was significantly longer in the DOSE 1 and DOSE 2 groups compared with the control group (61 m, 95% CI 9–113 m and 58 m, 95% CI 6–110 m, respectively).<br><br>The mean increase in gait speed was significantly greater in the DOSE 2 group vs. the control group (0.19 m/s, 95% CI 0.04 to 0.34), but not DOSE 1 compared to the control group (0.11m/s, 95% CI −0.04 to 0.26).<br><br>Mean increase in EQ-5D-L scores (VAS and Index scores) was significantly greater in both the DOSE 1 and DOSE 2 groups compared with the control group. |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | Duration was 4 weeks for all groups. | | Mean improvement in BBS scores. PHQ-9 and paretic knee strength was not significantly different compared with the control group.<br><br>*6 and 12-month outcomes*<br>Although participants in both groups continued to improve over 12 months, when combining the 2 DOSE groups, the time x group interaction term was not significant for the 6MWT at 6 or 12 months.<br><br>Participants in both groups continued to make gains in the 5-metre walk test, with no significant differences between groups at either time point.<br><br>The gains in EQ-5D-5 L VAS in the DOSE group were maintained at 6 and were significantly greater than the control group, but the control group continued to improve such that there was no significant difference between groups at 12 months.<br><br>9 participants were lost to follow-up or withdrew. |
| **Moore et al. 2020**<br><br>**Norway**<br><br>**Historically controlled study** | NA | 110 patients who sustained a stroke within the previous 2 months and were receiving inpatient stroke rehabilitation on one of two stroke rehabilitation units with goals to improve walking function. Mean age was 73.5 years, 58% were men. Mean time since stroke was 14 days. | The outcomes of a historical control group (patients treated with usual care during a previous one-year period) were compared with those of patients who received high-intensity training which focused on stepping practice at higher aerobic intensities (target of 70% to 85% age-predicted maximum heart rate) during scheduled PT treatments. Stepping was performed on treadmills and over ground, with safety harness systems and body weight support only as needed to ensure successful stepping. | **Primary outcomes:**<br>Self-selected and fastest gait speed, 6-minute walk test and the Berg Balance Scale (BBS)<br><br>**Secondary outcomes:**<br>Functional Ambulation Category (FAC) and Barthel Index (BI) | LOS was significantly shorter in the usual care group (23 vs. 35 days, p<0.001).<br><br>At discharge, the mean gains in self-selected and fastest walking speed were significantly greater in the intensive group (0.39±0.28 vs 0.16±0.26 m/s and 0.47±0.41 vs 0.17±0.38 m/s, respectively).<br><br>The gains in the 6MWT were also significantly greater in the intensive group (130±113 vs 64±93 m) as were mean gains in BBS (15±11 vs 8.8±8.8) and FAC (from 2.7 to 3.9 in the usual care group to 2.6 to 4.3 in the intensive group)<br><br>After adjusting for differences in LOS, the gains in self-selected and fastest walking speed remained significant, while those for the 6MWT and BBS, did not. |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | Therapy was provided until discharge. | | |
| **Hornby et al. 2019, 2022**<br><br>**USA**<br><br>**RCT**<br>***Very Intensive Variable Repetitive AmbulatioN Training (VIVRANT)*** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☑ | 97 participants with hemiparesis following stroke of >6 months duration who could walk 10 m overground without physical assistance but at self-selected speeds <1.0 m/s, using their customary assistive devices and below-knee bracing as needed. Mean age was 58 years, 60% were men. Mean time post stroke ranged from 27 to 60 months depending on group assignment. | Participants were randomized to receive ≤30 sessions over 2 months of i) high-intensity stepping training (70%–80% heart rate reserve) in variable contexts (high variable [HV]) using a treadmill and overground walking, ii) high-intensity stepping training forward on a treadmill and overground with minimal variability (high forward [HF]), and iii) low intensity (at 30% to 40% heart rate reserve) variable stepping training (low variable [LV]).<br><br>Each session was 40 minutes long and was provided 2-3x/week. | **Primary outcomes:**<br>Self-selected walking speed, fastest possible speeds (FS), 6-minute walk test (6MWT), steps/day<br><br>**Secondary Outcomes:**<br>Functional Gait Assessment (FAC), Activities-Specific Balance Confidence Scale (ABC)<br><br>Assessments were conducted at baseline, post-training, and 3-month follow-up | There were significant improvements in all primary outcome measures in all groups with greater increases in HV and HF compared with LV. ($p<0.001$ group x time for all 3 outcomes).<br><br>There were significant improvements in the mean number of steps/session and steps/minute in all groups with significantly greater increases in HV and HF groups compared with LV. ($p<0.001$ group x time for both outcomes).<br><br>There were significant improvements in mean FAC scores in both the HV and HF groups, but no significant improvements among the 3 groups (group x time interaction).<br><br>There was a significant improvement in mean ABC scores in only the HV group, with no significant improvements among the 3 groups (group x time interaction).<br><br>*Hornby 2022*<br>Correlation and regression analyses were used to identify demographic and clinical variables associated with steps per day at post training and follow-up.<br><br>In stepwise regression analyses, changes in 6MWT at post-training and at follow-up were the only significant independent predictors of steps/day$_{POST}$ and steps/day$_{FU.}$<br><br>Using conditional logistic regression, baseline 6MWT, lower-extremity Fugl-Meyer Assessment, and changes in 6MWT at post-training were independent predictors of steps/day$_{POST,}$ while change in 6MWT from baseline to post intervention, baseline 6MWT and ABC at follow-up were |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | | | independent predictors of steps/day$_{FU.}$ |
| **Hornby et al. 2016**<br><br>**USA**<br><br>**RCT**<br>***Variable Intensive Early Walking Poststroke (VIEWS) trial*** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☑ | 32 patients who had sustained a unilateral stroke within the previous 1-6 months who could walk 10 m overground with minimal or moderate physical assistance from a therapist or without physical assistance but at speeds ≤0.9 m/s. Mean age was 58 years, 72% were men. Mean time since stroke was 101 days. | Participants were randomized to receive ≤40, 1-hour experimental or control training sessions over 10 weeks. Experimental interventions consisted only of stepping practice at high cardiovascular intensity (70%-80% heart rate reserve) in variable contexts (tasks or environments). Control interventions were determined by clinical physical therapists and supplemented using standardized conventional strategies. | **Primary Outcomes:**<br>Walking speed, fastest possible speeds (FS), 6-minute walk test (6MWT), steps/day.<br><br>**Secondary Outcomes:**<br>Spatiotemporal symmetry, Balance Berg Scale (BBS), Timed 5x sit to stand task (5XSTS), Activities-Specific Balance Confidence scale (ABC), Physical subscale of the Medical outcomes Short Form (SF36).<br><br>Outcomes were assessed at baseline, midtraining, post-intervention, and at 2 months follow-up | Over the study period, there was a significant group x time (G x T) interaction for gait speed, 6MWT and FS (p=0.002; p=0.001, p=0.006), favouring the intervention group, but not for steps/day.<br><br>There was a significant G x T interaction for single-limb balance and single-limb stance (p<0.001; p=0.002), favouring the intervention but not for step symmetry.<br><br>There was a significant G x T interaction on the SF36 (p=0.014), favouring the intervention but not on the BBS, 5XSTS or the ABC.<br><br>There was significant difference between groups on gait velocity and on the 6MWT at midtraining, post-intervention and at follow-up (p<0.05). |

## Strength Training

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| **Veldema & Jansen 2020**<br><br>**Germany**<br><br>**Systematic review & meta-analysis** | PEDro scores ranged from 5-8 | 30 trials, including 1,051 participants recovering from stroke.<br><br>Group 1: Mean age ranged from 49 to 67 years, 64% were men. Time since stroke was ≤3 months (n=1), >6 months | Trials compared 1) resistance training provided in 8-40 sessions, mainly as concentric exercise vs. no intervention (Group 1; n=11); 2) resistance training vs. other intervention (Group 2; n=15) provided in 6-66 sessions and; 3) resistance training vs. another form of | **Primary outcomes:**<br>Measures of gait, muscular force, QoL, mobility, balance, spasticity, cognition, and emotions, measured by a wide range of measurements. | *Resistance training vs no intervention (403 participants):*<br>Across all outcomes, resistance training was not associated with a significant benefit (*d*= 0.75, 95% CI -0.08-1.57, 11 trials included).<br><br>Among subgroups of outcomes including the results of 2-6 trials, resistance training was not associated with significant improvements in measures of gait, |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | (n=8) and not stated in 2 trials.<br><br>Group 2: Mean age ranged from 40-69 years, 54% were men. Time since stroke was <3 months (n=1), 3-6 months (n=1), >6 months (n=12) and was not stated (n=1)<br><br>Group 3: Mean age ranged from 50 to 67 years, 61% were men. Time since stroke was 3.2 months (n=1) and >6 months (n=8) | resistance training (Group 3; n=9) provided in 12-40 session.<br><br>Pooled analyses were reported as Cohen's *d*<br><br>Treatment contrasts were highly variable across trials. | | mobility, spasticity, muscular force/motor function, QoL, cognition, balance or postural control.<br><br>*Resistance training versus other intervention (581 participants):*<br>Across all outcomes, resistance training was not associated with a significant benefit (*d*= 0.28, 95% CI -0.35-0.94)<br><br>Among subgroups of outcomes, resistance training was associated with significant improvements in measures of muscular force and motor function of lower limbs (*d*=0.99, 95% CI 0.28-1.70) and other health-relevant physiological indicators (*d*=0.66, 95% CI 0.07-1.25, n=4 trials) There were no significant improvements in any of the other outcomes assessed.<br><br>*Resistance training vs. another form of resistance training (n=286)*<br>Pooled analyses were not conducted. |
| **Kerr et al. 2017**<br><br>**UK**<br><br>**RCT** | CA: ☒<br><br>Blinding:<br>Patient☒<br>Assessor ☑<br><br>ITT: ☒ | 93 patients, recruited within 42 days of stroke onset who were able to produce some voluntary contraction of paretic lower limb muscle (score at least 28/100 on the lower limb section of the Motricity Index), and with potential to make clinically important improvements. Mean age was 68.8 years, 58% were men. Mean time since stroke was 33.5 days. | All patients received conventional physical therapy (CPT). Patients were randomized to receive functional strength training (FST) movement performance therapy (MPT) or to a control group that received no additional therapy.<br><br>Patients in the control group received an average of 9.2 hours of CPT over 6 weeks, patients in the FST + CPT group received an average of 7.4 hours and patients in the CPT + MPT group received an average of 8.9 hours. | **Primary Outcomes:**<br>Sit-to-Stand (STS; movement duration; flexion momentum duration; smoothness; co-ordination; symmetry when rising; symmetry at the end of the movement; paretic knee maximum angular velocity)<br><br>Outcomes were analyzed at baseline, post-intervention, and at 3-month follow-up. | Patients in all groups improved their STS ability, with 88% able to STS at follow-up compared with 56% at baseline.<br><br>There were no significant differences between groups on the STS or its subscales. |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | Patients in the 2 experimental groups received the additional therapies for up to 1 hour per day, 4 days per week for 6 weeks. | | |
| **Flansbjer et al. 2008 & Flansbjer et al. 2012 (4-yr follow-up)**<br><br>**Sweden**<br><br>**RCT** | CA: ☒<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☒ | 24 community-dwelling stroke participants who had sustained a stroke a minimum of 6 months previously and who were able to ambulate at least 200 m without supervision, with or without an aid. Mean age was 61 years, 58% were men. Mean time since stroke was 19 months. | Participants were randomized to a training group (n = 15) and participated in supervised progressive resistance training of the knee muscles (80% of maximum) twice weekly for 10 weeks, or to a control group (n = 9) who continued their usual daily activities. | **Primary Outcome:**<br>Muscle strength<br><br>**Secondary Outcomes:**<br>Modified Ashworth Scale, Timed Up & Go (TUG), Fast gait speed, 6-Minute Walk test (6MWT), stroke impact Scale (SIS)<br><br>Outcomes were assessed before and after treatment and 5 months post intervention and at 4 years | Outcome data from baseline, 5 months and 4 years are reported.<br><br>Mean ± sd dynamic knee muscle strength extension of (paretic)(Nm) side<br>Training group: 41.0 ± 13.6 to 59.4 ± 22.6 to 61.1 ± 15.8<br>Control group: 40.1 ± 18.7 to 42.0 ± 20.1 to 43.7 ±22.4,<br>The difference in change scores between groups was significant (p<0.001)<br><br>Mean ± sd dynamic knee muscle strength flexion of (paretic)(Nm) side<br>Training group: 43.5 ± 19.5 to 70.6 ± 26.7 to 69.0 ± 23.8<br>Control group: 50.7 ± 18.7 to 53.0 ± 22.1 to 55.0 ± 24.3<br>The difference in change scores between groups was significant (p<0.001)<br><br>Mean ± sd isokinetic knee muscle strength extension of (paretic)(Nm) side<br>Training group: 64.2 ± 31.1 to 76.3 ± 34.6 to 77.5 ± 24.2<br>Control group: 58.6 ± 35.3 to 61.7 ± 30.6 to 57.4 ± 34.4<br>The difference in change scores between groups was significant (p<0.05).<br><br>Mean ± sd isokinetic knee muscle strength flexion of (paretic)(Nm) side<br>Training group: 15.3 ± 19.0 to 26.5 ± 24.8 to 22.4± 20.9<br>Control group: 16.1 ± 15.7 to 20.0 ± 14.1 to 19.5 |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | | | ±19.2<br>The difference between groups was not significant.<br><br>Mean ± sd TUG (sec)<br>Training group: 28.6 ± 13.9 to 23.6 ± 11.1 to 20.5 ±8.7<br>Control group: 26.9 ± 15.2 to 26.7 ± 18.9 to 27.7 ± 21.8<br>The difference between groups was not significant.<br><br>Mean ± sd fast gait speed over 10 m (m/sec)<br>Training group: 0.86 ± 0.47 to 0.96 ± 0.41 to 0.92 ±0.41<br>Control group: 0.86 ± 0.51 to 0.86 ± 0.41 to 0.73 ±0.4<br>The difference between groups was not significant.<br><br>Mean ± sd 6MWT (m)<br>Training group: 228 ± 137 to 251 ± 144 to 275 ± 135<br>Control group: 234 ± 134 to 240 ± 140 to 223 ± 1370.4<br>The difference between groups was not significant.<br><br>(all significance levels refer to the comparison of baseline scores to 4-year follow-up)<br><br>Dropouts: 6 (training group n=4, control group n=2) |
| **Cooke et al. 2010**<br><br>**UK**<br><br>**RCT** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☑ | 109 participants with some voluntary muscle contraction in the lower paretic limb associated with stroke within 34 days of symptom onset. Mean age was 67 years, 60% were men. Mean time since stroke was 35 days. | Participants were randomized to one of three groups that received treatment for 1 hr/day x 4 days/week x 6 weeks (24 hrs total). The 3 groups were, conventional physiotherapy (CPT) (n=35), CPT+CPT (n=35) and functional training (FST) + CPT (n=38).<br><br>Experimental CPT included interventions that emphasized | **Primary Outcome:**<br>Walking speed (m/s).<br><br>**Secondary outcomes**:<br>Ability to walk >0.8m/s (i.e. community ambulation), knee extensor torque, and functional mobility.<br><br>Outcomes were measured 6 weeks after | Mean ± sd walking speed (m/sec) before and after treatment<br>CPT: 0.17 ± 0.24 to 0.30 ± 0.35<br>CPT + CPT: 0.27 ± 0.36 to 0.55 ± 0.49<br>FST + CPT: 0.23 ± 0.29 to 0.42 ± 0.39<br>p=0.031 (CPT vs. CPT+CPT),<br>p=ns (CPT vs. FST+CPT)<br><br>% of participants able to walk ≥0.8m/sec before and after treatment<br>CPT: 2.6 to 13<br>CPT + CPT: 14.3 to 35 |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | control/quality of movement and gave prominence to sensory stimulation and preparation of joint and muscle alignment prior to activating muscle or a functional task.<br><br>Content of FST<br>focused on repetitive, progressive resistive exercise during<br>goal-directed functional activity, such as sit-to-stand-to-sit, stair climbing/ step ups, inside and outside walking, transfer training, bed mobility, and treadmill training. | baseline and at follow-up 12 weeks thereafter. | FST + CPT: 2.8 to 20<br>p=0.038 (CPT vs. CPT+CPT)<br>p=ns (CPT vs. FST+CPT)<br><br>Mean ± sd Modified Rivermead Mobility Index scores before and after treatment<br>CPT: 29.4 ± 10.1 to 34.6 ± 10.8<br>CPT + CPT: 28.9 ± 11.0 to 36.6 ± 10.4<br>FST + CPT: 30.3 ± 10.2 to 37.7 ± 8.6<br>p=ns (CPT vs. CPT+CPT),<br>p=ns (CPT vs. FST+CPT)<br><br>There were no significant differences between groups on any of the other outcome measures at the end of treatment and no significant differences between groups on any of the outcomes assessed at follow-up.<br><br>Dropouts: at end of treatment n=10, at end of follow-up n=28 |

## Virtual Reality

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| **Zhang et al. 2021**<br><br>**China**<br><br>**Systematic review & meta-analysis** | Mean PEDro scores ranged from 3-9. Mean score was 5.6. | 87 RCTs including 3,540 participants with stroke with upper and lower disability. Mean age ranged from 46.3 to 76.4, 60% were men. Mean time from stroke onset ranged from 12.7 days to 19.2 years. | Trials compared VR rehabilitation interventions, many using commercially available devices such as Xbox Kinect vs. conventional rehabilitation or placebo therapy. | **Primary outcomes for lower extremity:**<br>Fugl Meyer Assessment-Lower Extremity (FMA-LE), Functional Ambulation Classification (FAC), Berg Balance Scale (BBS), 10 m Walk Test (10MWT), Time Up and Go (TUG), velocity, and cadence scores. | *Lower limb movement and function*<br>VR was associated with significantly higher FMA-LE scores (MD=3.01, 95% CI 1.91–4.11; 16 trials, n=732) and FAC scores (MD 0.47, 95% CI = 0.14–0.79; 5 trials, n=260).<br><br>*Balance and gait performance:*<br>VR was associated with significantly better BBS scores (MD=3.51, 95% CI 2.10–4.92; 21 trials, n=633), and faster TUG (MD= −2.10 sec, 95% CI −3.52 to −0.73, 17 trials, n=457) and gait speed (MD=11.79 cm/sec, 95% CI 8.48–15.11; 9 trials, n=310), but not performance on the 10MWT. |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| **Chen et al. 2021**<br><br>**Taiwan**<br><br>**RCT** | CA: ☒<br>Blinding patient: ☒<br>assessor:☒<br><br>ITT: ☑ | 30 patients with chronic stroke (> 6 months) and Brunnstrom stage II to V. Median age was 60 years, 60% were men. | Patients were randomized to receive VR-based rehabilitation using commercially available video games on the Microsoft Kinect system or conventional one-on-one in-person PT for 40 minutes/day, 3x/week x 4 weeks.<br><br>VR rehabilitation was provided in a hospital room simulating the patient's home environment | **Primary outcome:**<br>Berg Balance Scale (BBS) scores<br><br>**Secondary outcomes:**<br>Timed Up and Go (TUG) test, Modified Falls Efficacy Scale, Motricity Index (MI), and Functional Ambulation Category (FAC) | Patients in both groups had significantly improved median BSS scores from baseline to end of treatment with no significant differences between groups (intervention 45-50 vs. control 42-46).<br><br>Patients in the intervention group had significantly improved TUG scores from baseline to end of intervention, while those in the control group did not (26.2-23.9, p=0.005 vs. 24.8-20.2, p=0.28). There was no significant between group difference.<br><br>There were no significant improvements within or between groups from baseline to end of intervention for any of the other secondary outcomes. |
| **Ghai et al. 2020**<br><br>**Canada**<br><br>**Systematic review & meta-analysis** | PEDro scores were 9 (n=2), 8 (n=14), 7 (n=4), 6 (n=5), 5 (n=2) and 4 (n=4) | 32 trials including 809 participants recovering from stroke. Mean age ranged from 50.9 to 74.8 years, 55% were men. The time since stroke was <6 months in 6 trials, >6 months in 25 trials and time was not stated in one trial. | Trials examined VR only (n=18); VR + treadmill training (n=8) and VR + robotic-assisted training (n=6). Control conditions included conventional rehabilitation, treadmill training, robot assistance and a placebo condition (gaming). The duration of therapy ranged from 3-8 weeks in most trials.<br><br>The results of pooled analyses are reported as Hedge's *g* | **Primary outcomes:**<br>Gait speed, stride length and cadence | VR was not associated with faster gait speed (*g*=0.30, 95% CI −0.01 to 0.61; n=17 trials).<br><br>VR was associated with a significant increase in stride length (*g*=0.46, 95% CI 0.14–0.79; n=7 trials).<br><br>VR was associated with a significant increase in cadence (*g*=0.55, 95% CI 0.25–0.86; n=7 trials). |
| **Laver et al. 2017**<br><br>**Australia**<br><br>**Cochrane review** | Most trials were at low or unclear risk of bias in the 5 domains assessed | 72 RCTs including 2,470 participants recovering from stroke.<br><br>13 trials recruited participants within 3 months of stroke onset, 2 trials recruited participants within 6 months of stroke onset, 2 trials recruited | Trials examined the benefit of VR therapy on stroke-related impairments.<br><br>Total dose of therapy varied between studies:<br>4 trials: <5hrs<br>25 trials: 6-10hrs<br>26 trials: 11-20hrs<br>7 trials: >21hrs<br>1 trial: included lower and | **Primary Outcomes:**<br>Upper limb function and activity<br><br>**Secondary Outcomes:**<br>Gait, balance, global motor function, cognitive function, activity limitation, participation restriction and quality of life, adverse events. | *Virtual reality vs. conventional therapy*<br>VR was associated with significant improvement in ADL (SMD=0.25, 95% CI 0.06 to 0.43, 11 trials).<br><br>VR was not associated with a significant improvement in gait speed post intervention (MD=0.09 m/s,95% CI -0.04 to 0.22, 6 trials), TUG (MD=-1.76 sec, 95% CI -4.67 to 1.16, 3 trials) or balance (MD=0.39, 95% CI -0.09 to 0.86, 3 trials).<br><br>*VR+ usual care vs. usual care only* |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | participants within 12 months of stroke onset, 3 trials recruited participants over 2 or 3mo of stroke onset, and 31 trials recruited participants more than 6 months of stroke onset.<br><br>23 trials evaluated the effect of virtual reality on lower limb. | higher intensity training.<br><br>Most of the trials compared virtual reality intervention with a comparable alternative intervention. The alternative intervention was often described as therapy using a conventional approach. | Outcomes were assessed at post-intervention and at follow-up. | VR + usual care was associated with significant improvement in ADL (SMD=0.44, 95% CI 0.11 to 0.76, 8 trials), gait speed (MD=-4.76 m/s, 95% CI -8.91 to -0.61, 3 trials) and balance (SMD=0.59, 95% CI 0.28 to 0.90, 7 trials).<br><br>VR + usual care was not associated with a significant improvement in gait speed post intervention (MD=0.08 m/s, -0.05 to 0.21, 3 trials), or global motor function (n=3): SMD=0.01, 95% CI -0.60 to 0.61, 3 trials). |
| **Gibbons et al. 2016**<br><br>**Australia**<br><br>**Systematic review & meta-analysis** | PEDro scores ranged from 3 to 8, mean of 5.2 | 22 trials including 552 participants with stroke in the subacute (n=190 and chronic (n=362) stages. Mean age ranged from 41.3 to 64.5 years. | 14 trials focused on standing VR balance games including Nintendo Wii, X-box Kinect and IREX VR systems; 4 trials focused on VR treadmill training, and one each on VR-based ankle exercises, stepping exercises, obstacle training, and optimal movement training. In most trials the control group was conventional physiotherapy (11 trials).<br><br>Therapy was provided from 2x/wk to 5x/wk and ranged in duration from 2 to 8wk. | **Primary outcomes:**<br>Functional balance, static balance, functional mobility, spatiotemporal characteristics/kinematics of gait, motor function. | *Acute-Subacute stroke*<br>VR was not associated with significant improvements in functional balance at post intervention (SMD=0.42, 95% CI -0.21 to 1.06), functional mobility post intervention (WMD=-10.94, 95% CI -26.00 to 4.11) or motor function (SMD=0.20, 95% CI -0.92 to 1.31).<br><br>*Chronic stroke*<br>VR was associated with significant improvement in functional balance post intervention (SMD=0.42, 95% CI 0.11 to 0.73), cadence (WMD=11.91, 95% CI 2.05, to 21.78), stride length (WMD=9.79, 95% CI 0.74 to 18.84) and step length (WMD=5.74, 95% CI 0.91 to 10.56)<br><br>VR was not associated with significant improvement in functional balance at follow-up (SMD=0.38, 95% CI -0.73 to 1.50), static balance (WMD=0.28, 95% CI -1.93 to 2.49), functional mobility at post intervention: (WMD=-2.04, 95% CI -5.82 to 1.75) or at follow-up: WMD=-4.94, 95% CI -10.37 to 0.49). |
| **McEwen et al. 2014**<br><br>**Canada** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑ | 59 patients, recruited from an inpatient rehabilitation unit who could stand unaided for one minute. Mean age | Patients were randomized to receive (1) standard rehabilitation plus a program of virtual reality (VR) exercises (challenged balance while | **Primary Outcome:**<br>Timed Up and Go (TUG)<br><br>**Secondary Outcomes:**<br>Two Minute Walk Test | There was no significant difference in the improvement in mean TUG (sec) from baseline to one month between groups (VR group -7.8 vs. control group -5.7). |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| **RCT** | ITT: ☒ | was 64 years, 54% were men. Mean days since stroke onset was 34 days. | standing), or (2) the control group which received standard therapy plus VR exercises that did not challenge balance (sitting).<br><br>VR was provided as 10 to 12, 30-minute daily sessions for a 3-week period. | (TMWT), Chedoke McMaster Stroke Assessment Scale Leg domain.<br><br>Balance and mobility were assessed before, after, and 1 month after training. | There was no significant difference in the improvement in mean TMWT (feet) from baseline to one month between groups (VR group 111.2 vs. control group 70.5).<br><br>More participants in the treatment group showed improvements on the Chedoke McMaster Stroke Scale Leg domain right after treatment (p=0.04) and 1- month post (p=0.02) than the control group. |

## Mental Practice

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
|---|---|---|---|---|---|
| **Guerra et al. 2022**<br><br>**Brazil**<br><br>**RCT** | CA: ☒<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☒ | 16 participants, aged 50-80, with muscular strength deficiency in the affected side of the body ≥15% compared to the healthy side, who were able to complete the TUG test, walk 5 m independently with or without the use of walking devices or orthoses and who had a total score 25 on the Kinesthetic and Visual Imagery Questionnaire. Median age was 64 years. Mean time since stroke was 27 days. (Sex breakdown was not reported) | Participants were randomized to mental practice (MP) or control group (CG).<br><br>With the help of a physiotherapist, persons in the MP group visualized a series of images as if they were carrying out each of the mobility tasks' kinematic components as well as the complete task. Persons in the CG performed cognitive exercises related to memorizing, naming, and reasoning activities.<br><br>Interventions were provided 3x/week, total of 12 sessions. | **Primary outcomes:**<br>Timed Up and Go (TUG) and the Five-Minute Walk Test (5mWT)<br><br>**Secondary outcome:**<br>Assessment of Biomechanical Strategies performance during the activities in TUG (TUG-ABS), a 15-item test with possible scores ranging from 15 to 45 points | There were no significant differences between groups at the end of the intervention for any of the outcomes.<br><br>Median TUG (sec): 18 (MP) vs. 16.0 (CG), p=0.37<br><br>Median Gait speed (m/sec): 1.0 (MP) vs. 1.0 (CG), p=0.14<br><br>Median ABC-TUG score: 37.5 (MP) vs. 40.5 (CG), p=0.50 |
| **Silva et al. 2020**<br><br>**Brazil** | Risk of bias was assessed as high in >50% | 21 RCTs including 762 participants recovering from stroke. Mean aged ranged from 50 to 78 | Trials compared motor imagery (MI) +/- action observation, physical activity, or functional gait training. In | **Primary outcomes:**<br>Walking speed, motor function, functional mobility, dependence in | MI was associated with an increase in gait speed compared with usual care (SMD=0.44, 95% CI 0.06 to 0.81, 6 trials, n=191). GRADE: very low certainty |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
|---|---|---|---|---|---|
| **Cochrane review** | of trials for CA and blinding of participants and/or outcome assessors. | years, 60% were men. Four trials included participants in the subacute stroke stage (1-6 months), 6 in the chronic stroke stage (>6 months) and chronicity of stroke was not reported in 11 trials. In 14 trials, participants were recruited from a rehabilitation centre or hospital. | most trials, the participants were asked to imagine isolated movements related to gait or to imagine rigorous sports movements. Each session was 30-60 minutes with a total dose of 100 to 1200 minutes over 2-8 weeks. The control condition was physical therapy in most trials (total dose was 12 to 240 minutes). | ADL, walking endurance<br><br>Outcomes were assessed at baseline and the end of treatment. | MI was not associated with significant improvement in motor function assessed using the FMA-LE (MD= 2.24, 95 % CI -1.20 to 5.69; 3 trials, n=130) or functional mobility assessed with RMI or TUG (SMD=0.55, 95% CI -0.45 to 1.56; 4 trials, n=116). GRADE: very low certainty.<br><br>Pooled analyses were not possible for the remaining outcomes due to absence of data in original trials). |

## Rhythmic Auditory Stimulation (RAS)

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
|---|---|---|---|---|---|
| **Ghai & Ghai 2019**<br><br>**Germany**<br><br>**Systematic review & meta-analysis** | Median PEDro score was 5.5 | 38 trials (11 RCTs and 27 controlled trials) including 968 patients with stroke. Mean ages of most patients ranged from 50-70 years. Most trials included M>F. Most trials included patients in the chronic stage of stroke. | Trials examined music-based auditory cueing in addition to conventional physical therapy. Several trials used treadmill training.<br><br>Pooled analyses are reported as weighted Hedge's *g* | **Primary outcomes:**<br>Gait velocity, Stride length, Cadence, Timed Up and Go (TUG) test | RAS was associated with significantly faster gait velocity (*g*=0.68, 95% CI 0.42 to 0.93; 25 trials included), increased stride length (*g*=0.50, 95% CI 0.26 to 0.73; 20 trials included), improved cadence (g=0.86, 95% CI 0.50 to 1.22; 23 trials included) and improvement in TUG (g= -0.76, 95% CI -1.36 to −0.16; 6 trials included).<br><br>Gait and balance training with auditory cueing for 20–45 minutes session, for 3–5 times a week provided maximum improvement. |
| **Yoo 2016**<br><br>**South Korea**<br><br>**Systematic review & meta-analysis** | The areas of deficiency were CA (4/8), blinding of assessors (6/8) and incomplete data | 8 RCTs (n=242) including person with hemiparesis following stroke. Mean age was 63.0 years, 59% were men. Mean time since stroke was 7.0 months. 4 trials included person <3 months post stroke, 2 in | Trials compared intentional synchronization of target movement to externally generated rhythmic auditory cueing as the primary intervening stimulus compared with traditional rehabilitative interventions or other controlled interventions | **Primary outcomes:**<br>Lower limb-velocity, cadence, stride length<br><br>Pooled analyses are reported as weighted Hedge's *g* | RAS was associated with large significant effect sizes for all outcomes.<br>Gait velocity: *g*=0.98, 95% CI 0.69 to 1.28<br>Cadence: *g*=0.84, 95% CI 0.63 to 1.15<br>Stride length: *g*=0.76, 95% CI 0.47 to 1.05<br><br>Effect sizes for gait velocity and cadence were higher in studies including persons in the acute stage of stroke. |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
|---|---|---|---|---|---|
| | outcome (3/8) | the chronic stage and 2 in the subacute or chronic stage | using different cueing (i.e., visual cueing) or using different rehabilitative strategies | | |
| **Suh et al. 2014**<br><br>**South Korea**<br><br>**RCT** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☒ | 16 persons who had sustained a stroke >6 months previously, who were able to walk ≥10 m with or without lower limb orthoses and were able to distinguish some auditory stimuli. Mean age was 65 years, 63% were men. Mean time since stroke onset was 305 days. | Patients were randomized 1:1 to receive gait training with RAS vs. gait training without RAS for 3 weeks. In the RAS group, patients received a gait training session with 15-minute RAS each time, 5 times a week with his/her guardian. | **Primary outcomes:**<br>Gait velocity, stride length, and cadence<br><br>**Secondary outcomes:**<br>Measures of standing balance | At the end of training, there was significantly greater improvement in mean gait velocity in the RAS group (1.54 vs. 1.31 m/min, p=0.012), but not in mean cadence (5.24 vs.1.54 steps/min, p=0.141) or mean stride length (0.01 vs. 0.0 m, p=0.46).<br><br>At the end of training, there was significantly greater improvement in measures of balance in the RAS group (overall stability index, anteroposterior index and mediolateral index) |
| **Thaut et al. 2007**<br><br>**USA**<br><br>**RCT** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☑ | 78 patients with mild to moderate sensory dysfunction, and lower-limb spasticity following stroke. Mean age was 69 years, 52.5% were men. Mean time since stroke was 21.5 days. | Participants were randomized to receive either Rhythmic Auditory Stimulation (RAS) using a metronome and specifically prepared music tapes or NDT/Bobath training.<br><br>Patients in both groups received therapy for 30 minutes, 5days/week for 3 weeks. | **Primary Outcomes:**<br>velocity, stride length, cadence, swing symmetry<br><br>All patients were tested 1 day before the training sessions started and 1 day after the last training session. | After 3 weeks of training, there was significantly greater improvement in the RAS groups for all outcomes.<br>Mean differences in change between groups<br>Gait velocity: 13.1 m/min, p=0.006<br>Stride length: 0.18 m, p=0.0001<br>Cadence: 19 steps/min, p=0.0001<br>Symmetry: 0.10 stride ratio, p=0.049) |

## Biofeedback (EMG/visual/auditory)

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
|---|---|---|---|---|---|
| **Stanton et al. 2017**<br><br>**Australia**<br><br>**Systematic** | PEDro scores ranged from 5-8 | 18 trials including 429 persons recovering from stroke. Mean age ranged from 47 to 66 years, 61% were men. | Interventions under examination included: weight distribution from a force platform or sensor (11 trials); muscle activity from EMG (3 trials); linear gait parameters | **Primary Outcomes:**<br>Lower limb activities (combination of standing, walking, balance) | At the end of the intervention, biofeedback was associated with a significant improvement in lower limb activities (SMD=0.50, 95% CI 0.30 to 0.7; 17 trials included). |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| **review** | | 7 trials evaluated participants <6mo post stroke, 8 trials evaluated participants >6mo post stroke, and 3 trials did not provide information on time post stoke onset. | such as step width or length from foot sensors (three trials); and joint angle from a goniometer (one trial). Visual feedback was used in seven trials; auditory in seven trials; and a combination of both in four trials. The control conditions were usual care (16 trials) or no biofeedback (2 trials)<br><br>The mean duration of intervention sessions was 33 minutes (SD 17), occurring with a mean frequency of 3.7 days per week (SD 1.6), and a mean duration of 5.2 weeks (SD 2.2). | | |

## Ankle-Foot Orthoses (AFO)

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
|---|---|---|---|---|---|
| **Daryabor et al. 2022**<br><br>**Iran**<br><br>**Systematic review & meta-analysis** | Downs & Black scores ranged from 8-13/17 | 30 studies (6 RCTs) including 669 participants with stroke. In most trials, people were able to walk independently with or without assistance. Mean age ranged from 41.6 to 65.6 years.<br><br>Most studies recruited participants with chronic stroke (>6 months), 7 studies included persons < 3 months, and 3 | Studies compared the use of AFOs with no AFO.<br><br>AFO types included hinged plastic or metal AFO with plantarflexion stop and dorsiflexion free, dynamic AFO, plastic AFO, posterior leaf spring AFO and rigid AFO.<br><br>Time for adaptation to AFO before repeat assessment varied widely from | **Primary outcomes:**<br>Berg Balance Scale (BBS), Timed-up-and Go (TUG), Functional Ambulation Categories (FAC), 6-Minute Walk Test (6MWT) and Motricity Index (MI) | Compared with no AFO, the use of an AFO was associated with significantly better performance on BBS (SMD= 0.54, CI 0.19–0.88; 7 studies), TUG (SMD= 0.45, CI 0.67 to 0.24; 12 studies), FAC (SMD=1.72, CI 1.25–2.19; 8 studies), 6MWT (SMD=0.91, CI 0.53–1.28; 4 studies), and MI (SMD= 0.65, CI 0.38–0.92; 2 studies). |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | studies included persons in the subacute and chronic stage of stroke. | immediate to 6 months. | | |
| **Choo & Chang 2021**<br><br>**South Korea**<br><br>**Systematic review & meta-analysis** | 3 trials were at high risk of bias due to generation of the randomization schedule, 18 were at unclear risk of bias for CA, and blinding of patients and/or assessors. 18 trials were at low risk of attrition or reporting bias. | 19 studies including 434 participants in the subacute (1-6 months, n=9) or chronic (>6 months, n=10) stage post stroke. Mean age ranged from 45.1 to 65.6 years. | Trials compared the use of AFOs vs. no AFO (wearing a shoe without an AFO or going or barefoot).<br><br>Assessments were conducted either immediately after donning the AFO or after short-term use (1 week to 6 months after AFO application) | **Primary outcomes:**<br>Gait parameters, gait ability and balance | AFO use was associated with a significant improvement in:<br>Walking speed (SMD=0.50, 95% CI 0.34–0.66;15 trials, 253 participants)<br><br>Cadence (SMD=0.42; 95% CI 0.22–0.62; 8 trials, 163 participants)<br><br>Step length (SMD=0.41; 95% CI 0.18–0.63; 7 trials, 112 participants)<br><br>Stride length (SMD= 0.43; 95% CI 0.15–0.71; 5 studies, 92 participants)<br><br>Timed up-and-go test (SMD - − 0.30; 95% CI − 0.54 to − 0.07; 4 studies, 143 participants)<br><br>Functional ambulation category (FAC) score (SMD=1.61; 95% CI 1.19–2.02; 3 studies, 61 participants) |
| **Shahabi et al. 2020**<br><br>**Iran**<br><br>**Systematic review & meta-analysis** | All trials were at high or unclear risk of bias in ≥1/6 domains assessed, except one trial, where risk of bias was low in all domains. | 14 studies including 1,186 participants recovering from stroke in the sub-acute or chronic stage. Mean age ranged from 42.5 to 67 years, 57% were men. | Trials compared AFO vs. no intervention; AFO vs. another intervention; and AFO vs. another type of AFO.<br><br>Follow-up ranged from immediate to 12 months. | **Primary outcome:**<br>Gait speed | The use of an AFO was not associated with a significant improvement in gait speed compared with no AFO (SMD=0.41, 95% CI −0.15 to 0.96; 4 trials included).<br><br>The use of an AFO was not associated with a significant improvement in gait speed compared with FES (SMD=0.00, 95% CI −0.16 to 0.16; 8 trials included).<br><br>The use of an AFO was not associated with a significant improvement in gait speed compared with another type of AFO (SMD=0.22, 95% CI −0.05 to 0.49; 4 trials included). |
| **Nikamp et al. 2017** | CA: ☑<br><br>Blinding: | 33 patients with hemiparesis following stroke who were | Participants were randomized wear an off-the-shelf AFO early (week 1) or | **Primary Outcomes:**<br>Berg Balance Scale (BBS), Functional Ambulation | There were significant improvements after 2 weeks in both the early and delayed groups (BBS: p = 0.011, FAC: p = 0.008, 6MWT: p = 0.005, TUG: |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
|---|---|---|---|---|---|
| **Netherlands**<br><br>**RCT** | Patient ☒<br>Assessor ☑<br><br>ITT: ☒ | receiving inpatient rehabilitation at inclusion, for whom an AFO was indicated. Mean age was 57.2 years, 61% were men. Mean time since stroke was 31 days. | after a delay (9 weeks). | categories (FAC), 6-minute walk test (6MWT), 10-meter walk test (10MWT), Rivermead Mobility Index (RMI), Barthel Index, Timed up and go Test (TUG).<br><br>Assessments were conducted at weeks 1 and 3 (early group) and at 9 and 11 weeks (delayed group) | p = 0.028).<br><br>There was significantly greater improvement in the early group in mean BBS scores (+11.5 vs. +3, mean difference =8.5) and the 10MWT (+0.23m/sec vs. +0.02, mean difference=0.23), compared with the delayed group.<br><br>After adjustment for covariates, the results were significant in the early groups for BBS (+5.1 points, p = 0.002), BI (+1.9 points, p = 0.002) and non-significant improvements on 10MWT (+0.14 m/s, p = 0.093) and TUG (-5.4 seconds, p = 0.087), compared with delayed provision |
| **Tyson & Kent 2013**<br><br>**UK**<br><br>**Systematic review & meta-analysis** | The risk of bias in all trials was low. | 13 crossover RCTs including 334 participants with stroke.<br><br>Participants in all studies were in the subacute or chronic stage of stroke and were able to stand and walk alone for at least 10 m. Participants in 2 studies were not functional ambulators. | Comparisons of participants walking with and without an AFO. Most of the AFOs were rigid, molded plastic and custom-made. All trials were crossover design.<br><br>Most participants had worn the AFO for at least a week prior to testing. Some were regular users of the device. Participants in 4 trials had worn the orthosis for< 1 week or had no time to habituate prior to testing. | **Primary Outcomes:** Measures of mobility and balance<br><br>Outcomes were assessed during a single testing session, whereby use of an AFO was compared with no AFO. | Gait speed (m/s): mean difference= 0.06, 95% CI, 0.03 to 0.08, p<.0001. Results from 11 trials included.<br><br>Step or stride length: SMD= 0.28, 95% CI 0.05 to 0.51, p=0.02. Results from 7 trials included.<br><br>Functional Ambulation Categories: SMD= 1.34; 95% CI 0.95 to 1.72, p<.001. Results from 3 trials included.<br><br>Timed-up and Go: SMD= 0.39, 95% CI -0.83 to 0.06, p=0.09. Results from 2 trials included.<br><br>Weight distribution while standing: SMD=0.32, 95% CI- 0.52 to-0.11, p=0.003. Results from 5 trials included.<br><br>Postural sway: SMD= -0.18, 95% CI -0.40 to 0.04, p=0.10. Results from 4 trials included. |
| **Erel et al. 2011**<br><br>**Turkey**<br><br>**RCT** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☒ | 32 patients recruited from a neurological outpatient clinic recovering from stroke with a maximum modified | Patients were randomized to wear a custom dynamic ankle-foot orthosis worn inside tennis shoes, or tennis shoes only for 3 months. No | **Primary outcomes:** Functional Reach, Timed Up and Go (TUG), Time up stairs (TUS), time downstairs (TDS), gait | Mean ±sd outcomes at baseline and at 3 months for AFO and control groups were:<br><br>Functional reach (cm): 28.50±8.48 to 33.43±9.59 vs. 27.11±5.41 to 28.46±4.4, p=0.065 |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | ITT: ☒ | Ashworth Scale score of 3, a score of 3-5 on Functional Ambulation Classification, and were at least 6 months post stroke. Mean age was 47 years, 64% were men. Mean time since stroke was 27 months. | therapy was provided. | velocity and Physiological Cost Index (PCI).<br><br>Assessments were conducted at baseline and 3 months | TUG (sec): 16.57±10.01 to 14.79±10.36 vs. 22.50±13.53 to 19.07±8.19, p=0.065<br><br>TDS (sec): 15.29±12.72 to 13.29±11.21 vs. 18.11±10.38 to 15.36±8.37, p=0.117<br><br>TUS (sec): 13.64±12.59 to 12.00±10.21 vs. 18.93±15.99 to 15.00±7.29, p=0.040<br><br>Gait velocity (m/s): 0.84±0.40 to 0.99±0.45 vs. 0.65±0.19 to 0.72±0.20, p=0.001<br><br>PCI (beats/min): 0.19±0.10 to 0.12±0.06 vs. 0.31±0.23 to 0.28±0.13, p=0.001<br><br>Dropouts: n=4, 2 from each group |

## Electrical Stimulation

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| *Functional Electrical Stimulation (FES)* | | | | | |
| **Jaqueline da Cunha et al. 2021**<br><br>**Brazil**<br><br>**Systematic review & meta-analysis** | Median PEDro score was 5 (range 4-7) | 14 trials including 1,115 participants recovering from stroke. Mean age ranged from 45 to 72 years. 12 trials were conducted in the chronic stage of stroke, 1 in the acute stage and 2 in the subacute stage. | Trials compared FES applied to the paretic peroneal nerve +/- cointerventions vs. conventional treatment.<br><br>In 12 trials, peroneal nerve devices were used, and 2 trials used conventional FES devices.<br><br>The stimulation sessions ranged from 20-60 minutes, 1-7/week, for 1 day to 30 weeks. | **Primary outcome:**<br>10-m Walk Test (10MWT)<br><br>**Secondary Outcomes:**<br>Berg Balance Scale (BBS), Timed Up and Go test (TUG), Active ankle dorsiflexion mobility | FES + supervised exercises were associated with a significant improvement in 10MWT performance compared with supervised exercise alone (SMD=0.51, 95% CI 0.16 to 0.86; 5 studies, n= 133).<br><br>FES alone was not associated with a significant improvement in gait speed compared to conventional treatments (SMD=0.092, 95% CI -0.34 to 0.53; 12 studies, n= 1077).<br><br>FES +/- supervised exercises were associated with a significant improvement in BBS scores (MD= 2.76 (95% CI: 0.64 to 4.88; 5 studies, n=780).and TUG (MD =--3.19, 95% CI -5.76 to -0.62; 5 studies, |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | | | n=780) compared with conventional therapy.<br><br>The overall quality of the evidence using the GRADE system was rated low for all outcomes. |
| **Nascimento et al. 2020**<br><br>**Brazil**<br><br>**Systematic review & meta-analysis** | Mean PEDro score was 5.8 (range 4-7) | 11 trials including 1,135 participants who were ambulatory post stroke. Mean age ranged from 47 to 65 years. 7 trials were conducted in the chronic stage of stroke, 1 in the acute stage and 3 in the acute and chronic stage. | Trials compared AFO vs. no therapy or placebo therapy (n=2), FES vs. no therapy or placebo therapy (n=5) and FES vs. AFO (n=4). In 8 trials, additional physical therapy was provided to persons in both groups.<br><br>Mean duration of treatment ranged from 10-18 weeks.<br><br>In all trials, either FES or AFO was applied throughout the day, with the aim at reducing footdrop during the swing phase of gait. | **Primary outcomes:** Walking speed (m/sec) and balance (BBS) | AFO was associated with significantly faster gait speed (MD=0.24 m/s, 95% CI 0.06 to 0.41; 2 trials, n=61).<br><br>FES was associated with significantly increased walking speed (MD=0.09 m/s, 95% CI 0.03 to 0.14; 4 trials, n=125).<br><br>There was no significant difference in walking speed between AFO and FES groups (MD=0.00 m/s; 95% CI −0.06 to 0.05; 4 trials, n=895).<br><br>There was no significant difference in BBS scores between AFO and FES groups (MD=0.27; 95% CI −0.85 to 1.39; 2 trials, n=692). |
| **Howlett et al. 2015**<br><br>**Australia**<br><br>**Systematic review & meta-analysis** | Mean PEDro score was 5.5. Most scores were 5 or 6. One trial was considered to be of high quality. | 18 RCTs (n=485) including persons with stroke of any level of disability and any chronicity. Mean age ranged from 48 to 70 years, 52% were men. The mean time after stroke ranged from <1 to 51 months, with 61% of the trials carried out after 6 months. | Trials compared FES vs. no intervention or placebo intervention or training of the same activity as the experimental group but without any electrical stimulation for upper and lower-limb rehabilitation. 8 trials involved the lower limb. Overall, length of FES sessions ranged from 20 minutes to 6 hours, frequency of sessions ranged from 2 to 7 per week and the duration of sessions ranged from 2 to 12 weeks, with the total dose of intervention ranging from 5 | **Primary outcome:** Activity (defined by ICF), gait speed | FES was associated in significantly faster gait speed compared with training alone (MD= 0.08 m/s (95% CI 0.02 to 0.15; 8 trials, n= 203 participants).<br><br>(Activity outcomes included results from both upper and lower-limb trials) |

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| | | | to 90 hours. The frequency of the electrical stimulation ranged from 25 to 50Hz, and pulse width ranged from 200 to 400µs. | | |
| **Shendkar et al. 2015**<br><br>**India**<br><br>**RCT** | CA: ☒<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☒ | 34 participants with hemiparesis following stroke, who were able to walk at least 10 metres independently. Mean age was approximately 50 years, 61% were men. Mean time since stroke was 5.2 months. | Participants were divided into two equal groups, where one group received functional electrical stimulation (FES) on the lower affected limb for 30 minutes, and the other group received conventional physiotherapy for 60 minutes. | **Primary Outcomes:**<br>Walking Speed (m/min); Cadence (steps/min); Step Length; Single Limb Support (SLS), Double Limb Support (DLS); Pulling Power; Swing Power; Ground Impact; stride length (m), stride length (m)<br><br>Participants were assessed before the intervention and after the intervention. | There was no significant difference within or between groups in gait speed, cadence, stride length or step length.<br><br>Both groups demonstrated a significant change from baseline to posttreatment on the SLS (p=0.020), SLS/DLS ratio (p=0.020), pulling acceleration (p=0.015), swing power (p=0.020), and ground impact (p=0.020).<br><br>A significant group x time interaction was found for the pulling acceleration (p=0.009), swing power (p=0.024), and ground impact (p=0.049), in favour of the FES group.<br><br>A significant difference between groups was found on the pulling acceleration (p=0.21), swing power (p=0.027), and ground impact (p=0.46), in favour of the FES group. |
| **Bethoux et al. 2014**<br><br>**USA**<br><br>**RCT** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☒<br><br>ITT: ☑ | 495 patients recruited from 30 sites who were ≥ 6-months post stroke who had limited dorsiflexion with poor limb clearance during swing phase of gait and were able to walk at least 10 meters with or without an assistive device. Mean age was 64 years, 61% were men. Mean time since stroke was 6.85 years. | Participants were randomized to wear an FES device (WalkAide [WA] FES system) or an AFO (articulated or fixed at the ankle) for 6 months. | **Primary Outcomes:**<br>10MWT, Activities of Daily Living (ADL), Social Participation domain scores of the Stroke Impact Scale (SIS), device-related serious adverse event (SAE) rate.<br><br>**Secondary Outcomes:**<br>6-Minute Walk Test (6MWT), Gait Rite Functional Ambulation Profile (FAP), Modified Emory Functional Ambulation Profile | Patients in both groups improved significantly from baseline to 6 months on the 10MWT. The WA was not inferior to AFO.<br><br>Patients in the WA group improved significantly from baseline to 6 months in SIS composite score. The between-group difference in mean change in SIS composite score was 1.1 points. The WA was not inferior to AFO.<br><br>Within the WA group, there were significant improvements in total mFEAP score, individual Floor and Obstacle course time scores of the mEFAP, FAP, and BBS, SIS strength and SIS mobility). |

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| | | | | (mEFAP), Berg Balance Scale (BBS), Timed Up and Go (TUG), Stroke-Specific Quality of Life (SSQoL)<br><br>Outcomes were assessed at baseline and 6 months | Within the AFO group, there was significant improvement in mean FAP scores only.<br><br>There were no significant between-group differences for any of the secondary outcomes, except the mEFAP Obstacle course. Mean time for completion was significantly shorter in the WA group. |
| **Everaert et al. 2013**<br><br>**Canada**<br><br>**Cross-over RCT** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☒<br><br>ITT: ☒ | 93 stroke patients with hemiparesis and foot drop (<1 year post stroke). Mean age was 57 years, 67% were men. Mean time since stroke was 6.4 months.<br><br>Participants had no prior experience with an AFO, and could ambulate 10m, FIM ambulation score ≥4. | Participants completed two phases for the study: 6 weeks with one device then 6 weeks with another.<br><br>The three treatment groups were: (1) WalkAide then Ankle-Foot Orthosis (AFO), (2) AFO then WalkAide, and (3) AFO for both phases. | **Primary Outcomes**: Figure-of-8 walking speed and Physiological Cost Index<br><br>**Secondary Outcomes**: 10m walking speed, modified Rivermead Mobility Index, Perceived Safety Level, and Device preference. | All groups showed significant increases on the Figure-8 task and 10m walk ($p<0.01$), and on the modified Rivermead Mobility index ($p<0.001$).<br><br>When comparing WalkAide to AFO for walking performance, improvements on the Figure 8 and 10m walk were not significantly different at phase 1 ($p=0.89$ and $p=0.75$, respectively) or phase 2 ($p=0.25$ and $p=0.66$, respectively).<br><br>Greater orthotic effect was shown at phase 1 and 2 for the AFO compared to the WalkAide. |
| **Pomeroy et al. 2006**<br><br>**UK**<br><br>**Cochrane review** | The risk of bias varied widely across trials. | 24 RCTs, (888 participants) of which 12 included interventions and outcomes associated with mobility. Mean age ranged from 52 76.5 years.<br><br>Participants were recruited an average of < 6 months (n=7) and ≥ 6 months (n=3) post stroke. Participants in 1 trial included participants with a stroke chronicity of both < and > 6 months. Timing of stroke onset was unclear in 1 trial. | Comparison of internal and external electrode devices that included single channel, multi-channel, patterned multichannel stimulators, EMG-triggered FES, TENS +/- conventional therapy vs. control condition (no stimulation, sham stimulation).<br><br>Intensity and frequency of intervention varied from 20-30 minutes, 2-3x/week, 20-60 minutes 5x/week, with duration of 3 to 12 weeks. | **Primary outcomes:** Walking endurance, Timed Up & Go test, Motor Assessment Scale<br><br>**Secondary outcomes:** Muscle tone, muscle function, gait velocity, cadence, stride length.<br><br>Outcomes were assessed before and after treatment. In one trial, outcomes were assessed at 8-9 week follow-up. | Electrical stimulation was not associated with significant improvement in gait speed (SMD= -0.02, 95% CI -0.30 to 0.26, 5 trials included) or stride length (SMD=0.36, 95% CI -0.93 to 1.63; 2 trials included).<br><br>Dropouts: No reporting in 8 trials. In the remaining trials n=16 |
| **Burridge et al. 1997** | CA: ☑ | 32 hemiplegic patients who had suffered a | Participants were randomized to receive either | **Primary outcomes:** Gait speed over 10 m. | Mean ± sd at baseline and follow-up for FES and control groups |

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| **UK**<br><br>**RCT** | Blinding:<br>Patient ☒<br>Assessor ☒<br><br>ITT: ☒ | single stroke at least 6 months prior to start of study who exhibited single drop foot but with sufficient dorsiflexion of the ankle with stimulation to enable heel strike when walking and without undue comfort. Patients had the ability to stand unsupported and walk 10m; ability to stand from sitting without help and the ability to walk 50m before stroke independently. Mean age was 57 years, 72% were men. Mean time since stroke was 4 years. | FES using the Odstock Dropped Foot Stimulator while receiving a course of physiotherapy (PT) based on the Bobath method or to receive a course of PT alone (control). Participants in both groups received 10 physiotherapy sessions each lasting 60 minutes. | **Secondary outcome:**<br>Walking efficiency assessed using the Physiological Cost Index (PCI)<br><br>Assessments were conducted at baseline, between 4 and 5 weeks and between 12 and 13 weeks. | Gait speed (m/s): 0.68±0.49 to 0.77±0.43 vs. 0.48±0.25 to 0.51±0.27. p=0.044<br><br>PCI (beats/min per m/min): 0.59±0.49 to 0.54±0.56 vs. 1.03±0.67 to 1.00±0.69. p=0.083<br><br>Dropouts: n=1 |
| *Neuromuscular Electrical Stimulation (NMES)* | | | | | |
| **Hong et al. 2018**<br><br>**China**<br><br>**Systematic review & meta-analysis** | Adequate randomization: 20 trials, adequate CA: 6 trials, adequate blinding of assessors: 11 trials, adequate reporting of outcome data: 18 trials. All trials were at unclear risk of selective reporting bias | 21 RCTs including 1,481 participants with chronic stroke and lower-limb dysfunction of >6 months. Mean age ranged from 49.1 to 71.2 years, 56% were men. Mean time since stroke ranged from > 6 to 108 months. | Trials compared NMES +/- other interventions. NMES included FES (n=11), NMES (n=2), a footdrop stimulator (n=2), TENS (n=2), implantable peroneal nerve stimulation (PNS, n=2) and in 2 trials the form of electrical stimulation was unspecified. The duration of the intervention ranged from 4 weeks to one year. Control conditions included conventional physical therapy, gait trainer exercise, task-related training, treadmill training usual care, AFO and placebo. | **Primary outcome:**<br>Lower limb motor function (gait speed, walking distance, and motor function assessment scales)<br><br>**Secondary outcomes:**<br>Gait speed, Berg Balance Scale (BBS), Timed Up and Go (TUG), 6-minute walk test (6MWT) | NMES was associated with a significant improvement in lower-limb gait function compared with a control condition (SMD=0.42, 95% CI 0.26 to 0.58; 21 trials), gait speed (SMD=0.41, 95% CI 0.22 to 0.61; 15 trials), BBS (MD=3.17, 95% CI 1.31 to 5.02; 7 trials) and TUG (MD= -2.96 sec, 95% CI -4.34 to -1.59; 6 trials).<br><br>NMES + other therapies was associated with a significant improvement in gait activity compared with a control condition (SMD=0.47, 95% CI 0.28 to 0.67; 18 trials). |

## Balance Training

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| *Virtual Reality* | | | | | |
| **Zhang et al. 2021**<br><br>**China**<br><br>**Systematic review & meta-analysis** | Mean PEDro score was 5.6 (range was 3-9). | 87 RCTs including 3,540 participants recovering from stroke. The mean age ranged from 46.3 to 76.4 years, 60% were men. The mean time of onset to stroke ranged from 12.7 days to 19.2 years. | Trials compared VR rehabilitation therapy vs. conventional rehabilitation or placebo therapy. | **Primary outcome of interest:**<br>Berg Balance Scale (BBS) | VR was associated with significantly greater improvement in BSS scores (MD=3.51, 95% CI 2.10 to 4.92; 21 trials; n=633). |
| **Iruthayarajah et al. 2017**<br><br>**Canada**<br><br>**Systematic review & meta-analysis** | PEDro scores ranged from 5 (fair) to 8 (good), with a mean score of 6.4 | 22 RCTs, including 552 participants recruited in the chronic phase of stroke. | The following treatments were examined.<br><br>Wii Fit balance board (7 studies) vs alternative exercise / conventional therapy / no treatment<br><br>VR + Treadmill training (7 studies) vs treadmill training / conventional therapy<br><br>Postural VR training (6 studies) vs alternative exercise / conventional therapy<br><br>Treatment was delivered for 20-80 minutes/day, 2-5 days/week, 3-12 weeks | **Primary Outcomes:**<br>Berg Balance Scale (BBS), Timed Up & Go Test (TUGT) | *BBS*<br>Combined: MD=2.94, 95%CI 1.82–4.06; 12 studies<br>Wii Fit: MD=2.01, 95%CI -0.578–4.59; 4 studies<br>Treadmill VR: MD=1.96, 95%CI -0.12–4.04; 3 studies<br>Postural VR: MD=3.82, 95%CI 2.27–5.37; 5 studies<br><br>*TUGT*<br>Combined: MD=2.49, 95%CI 1.37–3.61;13 studies<br>Wii Fit: MD=1.28, 95% CI-1.01–3.56; 5 studies<br>Treadmill VR: MD=2.15, 95% CI 0.41–3.88; 5 studies<br>Postural VR: MD=3.74, 95% CI 1.83–5.65; 3 studies |
| **de Rooij et al. 2016**<br><br>**Netherlands**<br><br>**Systematic review & meta-analysis** | 13 of the included studies had PEDro scores of 6-8 | 21 RCTs, including 516 participants recovering from stroke. Mean age ranged from 46 to 66 years, 37% to 69% were men. Time since stroke ranged from 13 days to 12 years. | Trials compared VR balance training vs. a non-VR control condition (8 trials) and VR training + conventional rehabilitation vs. a non-VR control condition (13 trials). | **Primary Outcomes:**<br>Berg Balance Scale (BBS), Timed Up & Go Test (TUGT)<br><br>Studies evaluated static balance (2 studies), | VR training was associated with significantly better performance on BBS vs. non-VR control (i.e.,) dose-matched (MD=2.18, 95% CI 1.52-2.85; 5 studies, n=130), TUGT, dose-matched (MD=2.48, 95% CI 1.28-3.67; 6 studies, n=132) and TUGT, VR + conventional rehab (MD=0.70, 95% CI 0.29-1.11; 1 study, n=20). |

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| | | | Treatment was delivered 2-5 sessions/week for 3-8 weeks | dynamic balance (7 studies), or both (9 studies)<br><br>Outcomes were assessed before and after treatment | VR training was not associated with significantly better performance on BBS, VR + conventional rehab (MD=1.17, 95% CI -6.54 to 8.88; 2 studies, n=44). |
| **Li et al. 2016**<br><br>**China**<br><br>**Systematic review & meta-analysis** | Risk of bias scores ranged from 2 to 4 (out of 5), with a mean score of 3 (good) | 16 RCTs, including 428 participants recruited in the acute/subacute (4 studies) and chronic (12 studies) phases of stroke | The following treatments were examined.<br>VR training + conventional therapy vs conventional therapy (10 studies)<br><br>VR treadmill training vs treadmill training (6 studies)<br><br>VR training: WiiFit (5 studies), IREX (3 studies), BalanceTrainer (2 studies)<br><br>Treatment was delivered for 15-30 minutes/session, 2-5 sessions/week, for 3-12 weeks. | **Primary Outcomes:**<br>Berg Balance Scale (BBS), Timed Up & Go Test (TUGT) Functional Reach Test (FRT), Activities-Specific Balance Confidence Scale (ABCS), Sway Velocity (SV), Weight Distribution (WD) | VR training was associated with significantly better performance BBS (MD=1.46, 95% CI 0.09-2.83; 8 studies, n=170) and TUGT (MD=-1.62, 95% CI -3.07 to -0.16; 8 studies, n=214).<br><br>VR training was not associated with significant improvement on any of the other outcomes, including the results from 2 to 3 trials (FRT: MD=1.97, 95% CI -0.22-4.17; ABC: MD=3.73, 95% CI -1.01 to 8.46; SV: MD=0.07, 95% CI -0.30 to 0.43 and WD: MD=-1.21, 95% CI -2.54 to 0.12) |
| *Trunk Training* | | | | | |
| **Thijs et al. 2023**<br><br>**Belgium**<br><br>**Cochrane review** | Most (≥50%) of the included trials were at high or unclear risk of bias for all domains assessed (random sequence generation, CA, blinding of patients, incomplete outcome data and selective | 68 RCTs including 2,585 participants recovering from stroke. Mean age was 60 years (range 44-76 years). In 16 trials, stroke occurred from one week to 3 months previously; in 8 trials, stroke occurred within 3-6 post stroke. In 29 trials, stroke had occurred >6 months previously. Details of stroke timing were not provided in 15 trials. | Trunk training interventions assessed included core-stability training (isometric strengthening of the trunk muscles, n=18 trials) electrical stimulation that targeted ≥ 1 core trunk muscles (n=7 trials), selective-trunk training aimed at improving selective movements of the upper and lower part of the trunk (n=15 trials), sitting-reaching therapy (n=6 trials), 10° steady-tilted platform (n=2 trials) and weight-shift training (n=4 trials). | **Primary outcomes of interest:**<br>Standing balance, walking ability | *Trunk training vs. non dose-matched therapy*<br>Trunk training was associated with a significant improvement in standing balance (SMD=0.57, 95% CI 0.35 to 0.79; 11 trials included). GRADE: very low certainty; and walking ability (SMD=0.73, 95% CI 0.52 to 0.94; 11 trials included). GRADE: very low certainty<br><br>*Trunk training vs. dose-matched therapy*<br>Trunk training was associated with a significant improvement in standing balance (SMD=1.00, 95% CI 0.86 to 1.15; 22 trials included). GRADE: very low certainty; and walking ability (SMD=0.69, 95% CI 0.51 to 0.87; 19 trials included). GRADE: low certainty |

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| | reporting). | | The median duration of therapy was 4 weeks, providing a median of 600 minutes of total training. The intensity of training ranged from 30 minutes to 2,700 minutes (45 hours).<br><br>Trials were classified as dose-dependent (n=44) or non dose dependent (n=20), based on the amount of therapy provided in the control arms. Therapy provided in the control groups was diverse. | | |
| **Van Criekinge et al. 2019**<br><br>**Belgium**<br><br>**Systematic review & meta-analysis** | Mean PEDro score was 6. | 22 RCTs including 394 participants recovering from stroke. Mean age was 69 years. Time since stroke ranged from 15 days to 47 months. | Trials compared trunk training alone or added to standard rehabilitation. Interventions of interest included reaching (performed beyond arm's length to enhance the truncal influence), core stability (task-specific movements of the upper and lower parts of the trunk both in the supine and sitting) and weight shifting | **Primary Outcomes:**<br>Standing balance and mobility | Trunk training was associated with significantly greater improvement in total Trunk Impairment Scale scores (SMD=1.34, 95% CI 0.96–1.71; 20 trials included), sitting balance (SMD=1.54, 95% CI 1.06–2.02; 20 trials included), standing balance (SMD=0.84, 95% CI 0.04–0.98; 6 trials included), and mobility (SMD=0.88, 95% CI 0.67–1.09; 8 trials included). |
| **Bank et al. 2016**<br><br>**Australia**<br><br>**Systematic review & meta-analysis** | PEDro scores ranged from 4 (fair) to 7 (good), with a mean score of 5.5 | 11 RCTs including persons recovering from stroke. Mean age ranged from 51 to 75.8 years. The percentage of men ranged from 36.2% to 70%. Mean time since stroke ranged from 11 days to 7.7 years (in 5 studies participants were recruited in the acute, in 5 studies, they were recruited in the subacute | Trials compared physiotherapy (PT) + additional therapy vs. PT only. The additional therapy was targeted at improving sitting balance training (5 studies), standing balance training (2 studies), trunk training (3 studies), lower limb training (2 studies), and gait training (2 studies) | **Primary Outcomes:**<br>Trunk Control Test (TCT), Trunk Impairment Scale (TIS)<br><br>Outcomes were assessed before and after treatment, with follow-up periods of 2 weeks to 6 months (5 studies) | Additional therapy was not associated with a significant improvement in TCT compared with PT only (MD=-1.53, 95% CI -9.37–6.32; 5 studies, n=263).<br><br>Additional therapy was associated with a significant improvement TIS (MD=1.70, 95% CI 0.62–2.78; 4 studies, n=106).<br><br>Adverse events: Fatigue (1 study), Discomfort (1 study), None (2 studies), Not reported (7 studies) |

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| | | stage, and in one trial, the chronic stage). | Treatment ranged from 20-60 minutes/session, 3-7 sessions/week, provided for 2-8 weeks. | | |
| **Sorinola et al 2014**<br><br>**UK**<br><br>**Systematic review & meta-analysis** | Risk of bias was judged to be low in two studies, moderate in two studies and high in two studies. | 6 RCTs (n=155) including survivors of ischemic or haemorrhagic stroke occurring within the previous 3 months. Mean age ranged from 55 to 72 years. Mean days post stroke ranged from 12.1 to 53 days. | Trials compared specific trunk exercises in lying and sitting positions or other specific interventions such as sitting balance training, weight shifting in sitting and arm reaching in sitting, in addition to conventional rehabilitation vs. conventional rehabilitation only. | **Primary outcomes:**<br>At least one validated measure of either functional independence, balance, mobility or trunk performance. | Additional trunk training was not associated a with significant difference between groups on global measures of trunk performance (SMD=0.50; 95% CI −0.25 to 1.25, p=0.19; 5 trials), or standing balance (SMD = 0.72, 95% CI −0.01 to 1.45, p = 0.05; 2 trials), but did improve walking ability (SMD=0.81, 95% CI 0.30 to 1.33; p= 0.002; 3 trials) |
| *Exercise Therapy* | | | | | |
| **Van Duijnhoven et al. 2016**<br><br>**Netherlands**<br><br>**Systematic review & meta-analysis** | 34 trials were considered high-quality | 43 RCTs<br><br>Stroke onset ranged from 7 months to 8 years | Exercise interventions: balance training (12 studies), gait training (14 studies), multisensory training (7 studies), aerobic exercise (4 studies), other training (6 studies). Treatment duration ranged from 2-62 hours total. | **Primary Outcome:**<br>Berg Balance Scale (BBS)<br><br>**Secondary Outcomes:**<br>Functional Reach Test (FRT), Sensory Organization Test (SOT) | *All Training:*<br>BBS: MD=2.22, 95%CI 1.26–3.17, p<0.01; $I^2$=52% (28 studies, N=985)<br><br>FRT: MD=3.12, 95%CI 0.90–5.35, p<0.01; $I^2$=74% (5 studies, N=153)<br><br>SOT: MD=6.77, 95%CI 0.83–12.7, p=0.03; $I^2$=0% (4 studies, N=173)<br><br>*Balance Training Only:*<br>BBS (MD=3.75, 95%CI 1.71–5.78, p<0.01; I2=52% (8 studies, N=235) |
| *Visual or auditory feedback* | | | | | |
| **Hyun et al. 2021**<br><br>**South Korea**<br><br>**RCT** | CA: ☒<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☒ | 40 participants with hemiparesis following stroke, with onset between 3 and 6 months previously who could independently perform standing motions without using their hands in a sitting position and maintain an independent standing posture for > | Persons were randomized 1:1 to a sit-to-stand group with real-time visual feedback (RVF-STS group) using the Wii Balance Board or a sit-to-stand control (C-STS) control group.<br><br>Persons in both groups received general physical therapy (exercise therapy, | **Primary outcome of interest:**<br>Berg Balance Scale (BBS), centre of pressure (COP), timed up-an-go (TUG)<br><br>Assessments were conducted before and after treatment | 5 persons in each group dropped out.<br><br>There was significantly greater improvement in BBS scores in the intervention group (from 37.2 to 51.3 vs. 41.6 to 47.7, p=0.014), COP (94.1 to 72.9 cm vs. 96.0 to 82.1 cm, p=0.003) and TUG (20.7 to 16.7 sec vs. 20.9 to 19.3 sec, p=0.012). |

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| | | one minute. Mean age was 60 years, 50% were men. Mean time since stroke was 4.8 months. | electrical stimulation therapy) once a day for 30 min, 5 days a week for 6 weeks + additional STS training provided for 20 minutes, 5x/week for the 6-week study period. | | |
| **Rao et al. 2013**<br><br>**USA**<br><br>**RCT** | CA: ☒<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☒ | 28 patients with acute stroke who had residual hemiparesis and observable stance asymmetry, and an incapacity to safely stand or walk unassisted. Mean age was 59 years, 82% were men. Mean time since stroke was 13 days. | Patients were randomized 1:1 to receive balance training using visual feedback and body weight support harness, with the Balance Master or a control group that received conventional treatment.<br><br>Both groups received similar physical therapy and other services, which were provided for 1 hour, 5 days a week and 30 min on Saturdays, for 2 weeks. | **Primary Outcomes:**<br>FMA-LE, Fugl-Meyer Balance test, the Functional Independence Measure for gait (FIM-G). | Fugl-Meyer Balance scores increased significantly for both the experimental (6.23±1.75 to 8.29±1.59, p= 0.001), and control (6.64±1.08 to 8.50±2.1, p=0.001) groups after treatment; however, the improvement between groups was not statistically significant.<br><br>FIM-G scores increased for both the experimental (1.64±1.15 to 3.57±1.34, p=0.001) and control groups (1.71±0.91 to 3.43±1.34, p=0.001); however, the improvement between groups was not statistically significant.<br><br>FMA-LE scores also improved for the experimental (15.28±6.41 to 19.36±5.72, p= 0.0002) and control (12.5±5.7 to 18.14±5.7, p= 0.00001) groups, with no significant difference between groups. |
| **Van Peppen et al. 2006**<br><br>**Netherlands**<br><br>**Systematic review & meta-analysis** | PEDro scores ranged from 3 (poor) to 6 (good), with a median score of 4 | 8 trials, including 214 participants recovering from stroke. Mean age ranged from 52 to 66 years. Mean time since stroke ranged from 33 to 134 days. In 4 trials, participants were recruited in the subacute stage, and in 4 trials, chronic. | Trials compared visual feedback balance training vs Conventional balance training. Devices used were the Balance Master (5 studies), Standing Feedback Trainer (2 studies), and the Nottingham Balance Platform (1 study)<br><br>Treatment was delivered for 2-8 weeks | **Primary Outcomes:**<br>Postural Sway (PS), Weight Distribution (WD), Berg Balance Scale (BBS), Timed Up & Go Test (TUGT) | Visual feedback balance training was not associated with significant improvements in any of the trials compared with conventional balance training. Effect sizes ranged from 0.14 to 0.28. |
| **Barclay-Goddard et al. 2004** | In 2 trials, the randomizatio n process | 7 RCTs, including 246 participants with abnormal weight bearing | Trials compared force platform balance training with visual or auditory feedback | **Primary Outcome:**<br>Berg Balance Scale (BBS), timed up-and-go (TUG) | *Visual Feedback*<br>Force platform feedback was not associated with significant improvement in either of the primary |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| **Canada**<br><br>**Cochrane Review** | was described. In two trials, there was no mention of withdrawals or dropouts. Concealment of allocation and intention to treat analysis was not stated in any of the studies. Selection bias was possible in all studies. | in the standing position or impaired standing balance following stroke. Mean age ranged from 49.2 years to 64.5 years. 30% to 71% of participants were men.<br><br>Participants in 6 trials were recruited an average of <6 months post stroke (range 36.5 days to 136 days); time post stroke was not stated in one trial.<br><br>Participants were dependent (4 studies) or independent (3 studies) in walking at the start of treatment. | vs. conventional treatment or other balance training or placebo balance training.<br><br>Force platforms with dual plates and continuous visual display (with/without auditory) were used in all studies.<br><br>Treatment duration ranged from 2-8 weeks. Intensity and frequency of treatment ranged from 20-60 minutes/session and 2-5 days/week | **Secondary Outcomes:** Laboratory measures of standing balance using force platform indicators, ADL instruments<br><br>Outcomes were assessed before and after treatment with follow-up periods of at least 1 month (3 studies) | outcomes, based on the results from 2-3 trials (Berg Balance Scale: MD=-1.98, 95% CI -5.55 to 1.59; Timed Up & Go: MD=7.31, 95% CI -1.32 to 15.94).<br><br>Force platform feedback was associated with significant improvements in measures of standing balance (Centre of Pressure Position [stance symmetry]: SMD=-0.68, 95% CI -1.31 to 0.04; Centre of Pressure Position [sway]: SMD=-0.10, 95% CI -0.57 to -0.36).<br><br>*Visual + Auditory Feedback*<br>Force platform feedback was associated with significant improvements in Centre of Pressure Position (stance symmetry): SMD=-4.02; 95% CI -5.99 to -2.04, p<0.0001 (2 studies). |
| *Motor Imagery* | | | | | |
| **Zhao et al. 2023**<br><br>**China**<br><br>**Systematic review & meta-analysis** | Using the RoB tool, the domains with the highest risk of bias were CA (15 trials), blinding of participants (n=18), and blinding of outcome assessors (n=13). | 23 RCTs including 1,109 participants with motor dysfunction of the lower limb, following stroke. One trial included participants in the acute stroke phase, 11 trials in the subacute stroke phase and 7 trials, in the chronic phase. | Trials compared motor imagery training (MIT) in addition to conventional rehabilitation vs. conventional rehabilitation only.<br><br>20 trials used kinesthetic MIT, whereby patients perceive their proprioception with the first-person view performing the movement; 2 trials used kinesthetic MIT associated with visual MIT (to visualize realistic movements from the third-person view) in their trials; and one trial applied visual or kinesthetic MIT | **Primary Outcome:** Fugl-Meyer Lower Extremity Assessment (FMA-LE)<br><br>**Secondary Outcomes:** Functional Ambulation Category (FAC), Berg Balance Scale (BBS), temporospatial gait variables (walking speed, cadence, and stride length), and Barthel index | MIT + conventional rehabilitation was associated with significant improvement in BBS scores (MD=6.29, 95% CI 2.82-9.79; 11 trials included) and FAC (SMD=0.59, 95% CI 0.40-0.79; 7 trials included). Patients in both the subacute and chronic stage of stroke both benefited from treatment.<br><br>MIT + conventional rehabilitation was associated with significant improvement in FMA-LE scores (WMD=2.63, 95% CI 2.07-3.19; 12 trials included).<br><br>MIT + conventional rehabilitation was associated with significant improvement temporospatial gait variables (walking speed, stride length, and cadence) and activities of daily living. |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | based on individual preferences. | | |
| **Li et al. 2017**<br><br>**China**<br><br>**Systematic review & meta-analysis** | Risk of bias was low or uncertain in 5 domains assessed in most trials. Risk of bias was high in most trials for blinding patients, and in a minority of trials, for random sequence generation. | 17 RCTs including 735 participants, recruited in the acute (3 studies), subacute (7 studies), and chronic (7 studies) phases of stroke. Mean age ranged from 47.7 to 77.9 years. | Trials compared motor imagery training + specific training/routine therapy vs. specific training/routine therapy only.<br><br>Treatment provision ranged from 5-30 minutes/session, 5-7 sessions/week, 2-8 weeks. | **Primary outcome of interest:**<br>Berg Balance Scale (BBS)<br><br>Outcomes were assessed before and after treatment | *MI + routine rehabilitation treatment vs. routine rehabilitation treatment*<br>The intervention was not associated with a significant improvement in BBS scores (MD=0.81, 95%CI -0.03 to .65; 11 trials, n=430) |
| **Tang et al. 2015**<br><br>**Canada**<br><br>**Systematic review & meta-analysis** | All studies were good quality (PEDro>5) | 19 RCTs including 729 participants, recruited >3 months post stroke. Participants were independent in walking with/without assistive devices in all trials. | Among the trials, which examined interventions to improve balance self-efficacy, 4 examined motor imagery (n=102), whereby motor imagery training was compared with less intensive/lower dose activity.<br><br>Treatment duration was <4 weeks (3 studies) or 1-3 months (1 study) and the frequency was 1-5 sessions/week | **Primary Outcomes:**<br>Activities-Specific Balance Confidence Scale, Falls Efficacy Scale<br><br>Balance self-efficacy was not the primary outcome in any of the studies.<br><br>Outcomes were assessed before and after treatment | Motor imagery was not associated with a significant improvement in balance self-efficacy (SMD=0.68, 95% CI -0.33 to 1.69; 4 trials, n=102). |
| *Whole body vibration* | | | | | |
| **Yin et al. 2023**<br><br>**Japan**<br><br>**Systematic review & meta-analysis** | Using the Jadad scale, 2 trials were judged to be of low quality (2/7) and the remaining | 22 RCTs), including 1,089 patients recovering from stroke. Ages ranged from 31.8 to 78.3 years. Mean time since stroke ranged from 31 days to 84 months. | Trials compared whole-body vibration training (WBVT) + routine rehabilitation vs. routine rehabilitation or sham WBVT (n=5). | **Primary outcome of interest:**<br>Berg Balance Scale (BBS)<br><br>**Secondary outcomes:** | WBVT was associated with a significantly greater improvement in BBS scores (MD = 4.08, 95% CI 2.39-5.76; 13 trials), TUGT (MD=−2.88, 95% CI −4.94 to - 0.81; 10 trials), and 10MWT (MD =−2.69, 95% CI −3.35 to −2.03; 7 trials). |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | trials were of high quality (>3/7). | | In addition, some trials added lower limb weight bearing training, basic walking training, extracorporeal shock wave therapy, music therapy, virtual reality technology, neuro-developmental treatment and treadmill training, to routine rehabilitation.<br><br>In most trials WBVT was provided as one session, 5-6 days/week for 4-6 weeks. | Timed Up-and-Go test (TUGT), 10- meter walk test (10MWT) | |
| **Yang et al. 2022**<br><br>**China**<br><br>**Systematic review & meta-analysis** | Risk of bias was assessed as low or unclear in all domains in all trials. | 13 RCTs including 687 patients recovering from stroke. Mean age ranged from 54.6 to 74.5 years. Mean time since stroke ranged from 19 days to 9 years. | Trials compared whole-body vibration training (WBVT) + conventional rehabilitation vs. conventional rehabilitation only.<br><br>Duration of treatment varied from a single session to 12 weeks. | **Primary outcome:**<br>Berg Balance Scale (BBS)<br><br>**Secondary outcomes:**<br>Timed Up & Go Test (TUGT), 10- meter walk test (10MWT) | WBVT was associated with a significantly greater improvement in BBS scores (MD=4.23, 95% CI 2.21-6.26; 6 trials, n=335).<br><br>WBVT was not associated with significantly greater improvement in either of the secondary outcomes. |
| *Traditional Chinese Exercises* | | | | | |
| **Zhang et al. 2023**<br><br>**China**<br><br>**Systematic review & meta-analysis** | All trials were at low or unclear risk of bias for 6/7 domains assessed. No trial blinded participants. | 12 RCTs including 966 persons with balance or motor disorders (Brunnstrom stage > III). Mean age ranged from 47.7 to 73.6 years. Mean time since stroke ranged from 46 days to 2 years. In most trials, time since stroke was >3 months. | Trials compared Tai Chi Yunshou +/- routine rehabilitation training vs. routine rehabilitation training, which could include occupational therapy, joint range of motion training, joint mobilization techniques, balance training, and walking training.<br><br>Therapy was provided 2-7x/week for 8-12 weeks. | **Primary outcome:**<br>Berg Balance Scale (BBS)<br><br>**Secondary outcomes:**<br>Modified BI (MBI), Timed Up and Go Test (TUGT), | Tai Chi was associated with significantly greater improvement in BBS scores compared with the control condition (MD = 4.87, 95% CI 4.46–5.28; 7 trials, n=690).<br><br>Tai Chi was associated with significantly greater improvement in modified BI scores compared with the control condition (MD = 4.61, 95% CI 3.61-5.61; 7 trials, n=604) and TUGT (MD=-3.22, 95% CI −3.71 to −2.73; 3 trials, n=254). |
| **Zheng et al. 2021** | 2 trials were at high risk of bias for | 19 RCTs including participants with stroke. Mean age ranged from | Trials compared Tai Chi +/- conventional rehabilitation vs. conventional rehabilitation, | **Primary outcome:**<br>Berg Balance Scale (BBS) | Tai Chi was associated with significantly greater improvement in balance (MD=7.67, 95% CI 3.44 - 11.90; 6 trials included), standing and walking test |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| **China**<br><br>**Systematic review & meta-analysis** | random sequence generation, one trial was at high risk of bias for CA, 9 trials were at high risk of bias for failing to blind participants. | 47.7 to 72.8 years. The percentage of men ranged from 40 to 86. Time since stroke was not reported. | regular activity, health education, traditional walking or physiotherapy.<br><br>Treatment was provided for 40-90 minutes per session, 2-7 x/week. | **Secondary outcomes:** Standing and Walking Test, Fugl-Meyer Assessment (FMA) | (MD=−3.42, 95% CI −4.22 to −2.63; 3 trials included) and FMA (MD=4.15, 95% CI 1.68-6.63; 10 trials included). |
| **Ge et al. 2017**<br><br>**China**<br><br>**Systematic review & meta-analysis** | 14 trials were at low risk of bias for random sequence generation; 5 trials were at low risk for CA; 11 trials used ITT and 10 trials blinded the outcomes assessor. | 31 RCTs, including 2,349 participants with stroke. Mean age was 75.8 years. Details of time since stroke were not reported. | Trials compared traditional Chinese exercise (TCE) +/- additional treatments vs. conventional exercise.<br><br>Tai Chi (20 studies), Baduanjin (6 studies), Daoyin (3 studies), Yijn Jing (2 studies)<br><br>Treatment was delivered 5-7days/week for 2-52 weeks | **Primary Outcomes:** Berg Balance Scale (BBS), Fugl-Meyer Assessment Balance (FMAB), Timed Up & Go Test (TUGT) | TCE was associated with significantly greater improvement in BBS (MD=2.07, 95% CI 1.52-2.62; 19 studies, n=1,272) and TUGT (MD=-1.7795% CI -2.87 to -0.67; 4 studies, n=202), but not FMAB (MD=0.83, 95% CI -0.10 to 1.77; 3 studies, n=114). |
| *Aquatic Exercises* | | | | | |
| **Ghayour Najafabadi et al. 2022**<br><br>**Iran**<br><br>**Systematic review & meta-analysis** | Using the Cochrane RoB tool, all trials were at low or unclear risk of bias in all 7 domains except for blinding of participants/assessors and high risk of | 17 RCTs including 629 participants with lower-limb disability following stroke. Mean age ranged from 20 to 75 years. Mean time since stroke ranged from 30 days to 18 months. In 11 trials, stroke duration was >6 months. | Trials compared aquatic therapy vs. land-based exercises including gait training, treadmill training, obstacle training, dual-task training, Halliwick exercise, balance exercise, stretching exercise, endurance training, and floor mat exercise (n=11 trials), or conventional therapy (n=6).<br><br>The duration of the | **Primary Outcomes:** Balance, gait speed (10-m walking test), mobility (TUG) | Aquatic therapy was associated with a significant improvement in balance (SMD=0.72, 95% CI 0.50–0.94; 11 trials, n=349).<br><br>Aquatic therapy was associated with a significant improvement in gait speed, (SMD=−0.45; 95% CI-0.71 to −0.19; 5 trials, n=160) and mobility (SMD=−0.43, 95% CI -0.7 to - 0.17, 8 trials, n=233). |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | bias for random sequence generation in one trial. | | interventions ranged from 2 to 12 weeks (2-5 sessions/week, 30–60-minute sessions). | | |
| **Chae et al. 2020**<br><br>**South Korea**<br><br>**Systematic review & meta-analysis** | PEDro scores ranged from 5-8 | 11 RCTs including 325 participants with hemiplegia following stroke. Mean age ranged from 56.9–68.6 years. 7 studies included persons in the chronic phase, and 4 trials in the subacute phase. | Trials hydrotherapy vs. land-based conventional therapy, including general physical activity, physiotherapy, and stretching/strengthening exercises.<br><br>Hydrotherapy was provided as 30–60-minute sessions, 2-5 x/week for 2-8 weeks. | **Primary Outcome:**<br>Berg Balance Scale (BBS)<br><br>**Secondary Outcome:**<br>Forward Reach Test (FRT), Timed up and Go (TUGT) test, paretic knee flexor/extensor torque | Hydrotherapy was associated with significant improvement in BBS scores (MD=1.60, 95% CI 1.00 to 2.19;10 trials, n=264). The benefit was greatest for patients in the chronic stage of stroke (MD=1.61, 95% CI 1.00–.21, 7 trials vs. subacute MD= 1.04, 95% CI −2.62 to 4.70, 3 trials).<br><br>Hydrotherapy was associated with significant improvements in FRT (MD= 1.78, 95% CI, 5 trials, n=115), TUGT (MD=−1.41, 95% CI −2.44 to -0.42, 6 trials, n=173), and knee extensor torque (MD= 6.14, 95% CI 0.59-11.7; 3 trials, n=88)<br><br>Subgroup analysis showed hydrotherapy for chronic stroke patients had significant effectiveness on Berg Balance Scale (mean difference = |
| **Saquetto et al. 2019**<br><br>**Brazil**<br><br>**Systematic review & meta-analysis** | PEDro scores ranged from 3 to 8. | 15 RCTs including participants with disability post stroke. Mean age ranged from 44 to 70 years, 58% were men. Time since stroke onset was not stated. | Trials compared water-based exercise vs land exercise and water-based exercise + land exercise vs land exercise.<br><br>Sessions lasted for 30-60 minutes and were provided 2-6x/week for 2-12 weeks.<br><br>Examples of aquatic therapy included water-based exercises, aquatic treadmill training, Halliwick-Therapy and hydrokinesiotherapy. | **Primary outcome:**<br>Berg Balance Scale (BBS)<br><br>**Secondary outcomes:**<br>Timed up and go (TUG), muscle strength, gait speed, aerobic capacity (peak $VO_2$), functional reach, quality of life (QoL), joint position sense | *Water-based exercise vs land exercise*<br>Water based interventions were associated with a significant improvement in BBS scores (MD=1.55, 95% CI 0.51-2.58, 4 trials, n=80), muscle strength (SMD=0.63, 95% CI 0.15 to 1.12, 3 studies, n=69),<br>TUG (MD=-1.22 sec, 95% CI -2.04 to -0.04, 2 trials, n=48), and aerobic capacity (MD=3.64, 95% CI 0.66 to 6.62, 2 studies, n=33)<br><br>Water based interventions were not associated with a significant improvement in gait speed or functional reach.<br><br>Only a single trial assessed QoL.<br><br>*Water-Based Exercise + Land Exercise Vs Land Exercise* |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | | | Water based interventions + land exercises were associated with a significant improvement in BBS scores (MD=2.34, 95% CI 1.31 to 3.38, 4 trials, n=149), TUG (MD=-2.29 sec, 95% CI -3.04 to -1.54, 2 trials, n=40), and gait speed (SMD=0.64, 95% CI 0.34 to 0.93, 4 trials, n=185).<br><br>Water based interventions + land exercises were associated with a significant improvement in QoL (SF-36 short form) subcomponents (role limitations due to physical functioning, role limitations due to emotional problems, vitality, 2 trials), but not with (physical functioning or role limitations due to emotional problems, 2 trials). |
| **Kim et al. 2016**<br><br>**South Korea**<br><br>**RCT** | CA: ☒<br><br>Blinding:<br>Patient ☒<br>Assessor ☒<br><br>ITT: ☒ | 20 patients ≥6 months post stroke who scored >24 points on the Mini-Mental State Examination, were capable of independently walking >10 m, had no visual field effect or handicap, and had no orthopedic disease of the lower limbs. Mean age was 68.5 years, 50% were men. Mean time since stroke was 11 months. | Patients were randomized 1:1 to receive a course of neurodevelopmental treatment (NDT) for 30 minutes a day, 5 days a week, for 6 weeks or the same amount of NDT plus aquatic dual-task for 30 minutes a day, 5 days a week, for 6 weeks. Aquatic dual-task training consisted of a stability exercise, stability exercise while conducting an assignment by using the hands, movement exercise, and movement exercise while conducting an assignment by using the hands. | **Primary outcomes:**<br>Berg Balance Scale (BBS), Five Times Sit to Stand Test (FTSST), and Functional Reach Test (FRT).<br><br>**Secondary outcomes:**<br>10-Meter Walk Test (10MWT), Timed Up and Go Test (TUGT), and Functional Gait Assessment (FGA) | Mean baseline BBS scores were 41.8 (experimental group) and 39.4 (control group). At the end of the treatment period, the mean improvement in BBS scores was significant greater in the experimental group (2.6 vs. 0.8, $p<0.05$).<br><br>Significantly greater improvements were made in the experimental group in mean FTSST and FRT scores (-3.5 vs. -0.5 sec, $p<0.05$ and 2.5 vs. 0.4, $p<0.05$, respectively), and on all the secondary outcomes. |

## Sit-to-Stand Training

| Study/Type | Quality Rating | Sample Descript ion | Method | Outcomes | Key Findings and Recommendations |
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| **Pollock et al. 2014**<br><br>**UK**<br><br>**Cochrane Review** | In 10 trials, the risk of bias was low or unclear in 4/4 domains assessed using the Cochrane RoB Tool | 13 RCTs (N=603) including persons recovering from a stroke. Mean age ranged from 53 to 74 years.<br><br>Participants were recruited 30-51 days (5 studies), 3-8 months (3 studies), and >1 year (3 studies); time post stroke was not stated in 1 study<br><br>In 6 trials, participants were independent in sit-to-stand, and in 3 trials, independent in walking. | Repetitive sit-to-stand (6 studies), exercise training programs (4 studies), sit-to-stand training program (1 study), augmented feedback (1 study), altered chair design (1 study)<br><br>Treatment ranged 15-60 minutes/session, 3-5 sessions/week, 2-12 weeks | **Primary Outcome:**<br>Sit-to-stand ability<br><br>**Secondary Outcomes**:<br>Time to sit-to-stand, lateral symmetry, incidence of falls, reaction forces, joint kinematics<br><br>Outcomes were assessed before and after treatment, with follow-up periods of 3 weeks to 33 months (7 studies) | Compared with usual care/ or no treatment, repetitive sit-to-stand was associated with increased odds of independence in sit-to-stand (OR=4.86, 95%CI 1.43–16.50; 1 trial included). GRADE: very low certainty<br><br>Repetitive sit-to-stand was associated with a significant reduction in the time taken to sit-to-stand (SMD= -0.34, 95% CI -0.62 to -0.06; 7 trials included) GRADE: moderate certainty<br><br>Repetitive sit-to-stand was not associated with a significantly increased risk of falling (OR=0.75, 95% CI 0.46 to 1.22; 5 trials) GRADE: low certainty |

## Aerobic Training

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| **Mah et al. 2022**<br><br>**Singapore**<br><br>**Systematic review & meta-analysis** | There were some concerns with risk of bias in 4 trials, assessed using the RoB 2 tool.<br><br>PEDro scores were 5/10 (n=2), 7/10 (n=4) | 7 RCTs including 944 participants with acute (<3 months) and sub-acute (3-6 months) stroke. | Trials compared the effect of high intensity exercise (HIE) vs. a control group receiving a physical therapy intervention of lower intensity or no specific intervention/usual care.<br><br>HIE was defined as achieving >60% of heart rate reserve (HRR) or VO2 peak, 70% of maximal heart rate (HRmax), or attaining a score of ≥14 on the rate of the perceived | **Primary Outcomes:**<br>6 min walk test (6MWT), gait speed, steps per day, Berg Balance scale (BBS) and the Barthel index (BI)<br><br>**Secondary Outcomes:**<br>Rate of Adverse Events | Three out of the four studies showed significant improvements in walking distance (6mwt) in the HIE group compared to the control group.<br><br>Three RCTs found significant improvements in gait speed in the group performing HIE compared to the control groups, which maintained at 3-6 months follow-up.<br><br>Out of 3 trials assessing BBS, in one trial scores were significantly higher in the HIE group.<br><br>Just one study examined steps per day and showed no significant difference between HIE and |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | and 8/10 (n=1) | | exertion Borg scale (6–20 rating scale) | | control groups. |
| **Saunders et al. 2020**<br><br>**UK**<br><br>**Cochrane review** | 36 trials were at low risk of bias for sequence generation, 32 were at low risk of bias for CA, 28 trials blinded the outcome assessor, 26 were at low risk of bias for incomplete outcome data and all but 2 trials were at unclear risk of bias for selective reporting | 75 RCTs trials, involving 3,017 stroke survivors who were considered suitable for fitness training. Mean age was approximately 62 years. The mean time since stroke onset ranged from 8.8 days in trials assessing participants before discharge from hospital to 7.7 years in trials assessing participants after hospital discharge | Trials compared cardiorespiratory interventions (32 trials, 1631 participants), resistance interventions (20 trials, 779 participants), and mixed training interventions 23 trials, 1,207) with usual care, no intervention, or a non-exercise intervention | **Primary outcomes:**<br>Death, death or dependency and disability<br><br>**Secondary outcomes:**<br>Physical fitness, mobility, physical function | *Cardiovascular vs. control (end of intervention)*<br>There were 4 deaths, 2 in the intervention group and 2 in the control group. No trial assessed death or dependence.<br><br>Active intervention was associated with a significant reduction in disability (SMD=0.52, 95% CI 0.19 to 0.84; 8 trials included). GRADE: moderate certainty<br><br>Active intervention was associated with a significant improvement in physical fitness (VO2 peak (mL/kg/ min, MD=3.4, 95% CI 2.98-3.83; 9 trials included). GRADE: moderate certainty<br><br>Active intervention was associated with significantly faster preferred walking speed (MD=4.47 m/min, 95% CI 2.07 to 6.87; 12 trials). GRADE: high certainty<br><br>Active intervention was associated with significantly greater endurance, assessed using the 6MWT (MD=33.4 meters, 95% CI 19.0 to 47.8; 16 trials included) GRADE: moderate certainty<br><br>Active intervention was associated with significantly better balance, assessed using the BBS (MD=1.92 points, 95% CI 0.16 to 3.68; 8 trials included) GRADE: moderate certainty<br><br>*Resistance Intervention vs. control (end of intervention)*<br>Resistance training was associated with significant improvements in muscle strength (SMD=0.58, 95% CI 0.06 to 1.1; 2 trials included). GRADE: low certainty; significant increase in preferred walking speed (MD=2.15 m/min, 95% CI 3.57 to 7.87; 5 trials included) GRADE: moderate; |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | | | significant improvement in 6MWT (MD=24.98 m, 95% CI 11.98 to 37.98; 5 trials included). GRADE: low certainty; and significant improvement in BBS scores (MD=3.27, 95% CI 2.15 to 4.38; 5 trials included) GRADE: low certainty<br><br>*Mixed training Interventions (end of intervention)* Mixed training interventions were associated with significant improvements in disability (small effect), physical fitness, preferred gait speed, and balance. |
| **Vanroy et al. 2017**<br><br>**Belgium**<br><br>**RCT** | CA: ☒<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☒ | 59 patients, recruited from an inpatient rehabilitation unit following a first-ever stroke who were able to cycle at 50 revolutions/min. Mean age was 65 years, 64% were men. Time since stroke was 3-10 weeks. | Patients were randomly allocated to a 3-month active cycling group + education (ACG, n=33), or to a control group that received passive mobilization therapy (CG, n=26). Afterward, patients in the ACG were randomly assigned either to a coaching (n=15) or to a noncoaching group (n=16) for 9 months. | **Primary Outcomes:**<br>Cardiovascular parameters, Strength, gait speed, gait ability.<br><br>Patients underwent a baseline assessment and reassessments after 3, 6, and 12 months. | There were no significant differences between training groups for the primary outcomes over time. However, patients in both groups showed significant improvements in in peak oxygen consumption, leg strength, and gait speed. |
| **Sandberg et al. 2016**<br><br>**Sweden**<br><br>**RCT** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☒<br><br>ITT: ☒ | 56 patients, recruited from a stroke unit who had a mild stroke (NIHSS <6) and were discharged to independent living. Patients had to be able to walk >5m with or without support. Mean age was 70 years, 50% were men. Mean time since stroke was 5 days. | Patients were randomized to receive 60 minutes of group aerobic exercise, including 2 sets of 8 minutes of exercise with intensity up to exertion level 14 or 15 of 20 on the Borg rating of perceived exertion scale, twice weekly for 12 weeks or to a control group that received no organized rehabilitation or scheduled physical exercise. | **Primary Outcomes:**<br>Peak work rate, 6-minute walk test (6MWT)<br><br>**Secondary Outcomes:**<br>Timed up and go Test (TUG), walking speed, single leg stance (SLS), European Quality of Life Scale (EQ-5D), Stroke impact Scale (SIS).<br><br>Participants were evaluated pre- and postintervention. | The following improved significantly more in the intervention group (pre- to postintervention): peak work rate (group × time interaction, P=.006), 6MWT (P=.011), maximum walking speed for 10m (P<.001), TUG test (P<.001), SLS right and left (eyes open) (P<.001 and P=.022, respectively), and SLS right (eyes closed) (P=.019).<br><br>Aerobic exercise was associated with improved EQ-5D scores (visual analog scale, P=.008) and perceived recovery (SIS domain 9, P=.002).<br><br>These patient-reported improvements persisted at 6-month follow-up. |
| **MacKay-Lyons et al. 2013** | CA: ☑<br><br>Blinding: | 50 patients recruited from an inpatient rehabilitation unit following first-ever | Patients were randomized to receive body weight supported treadmill training | **Primary outcome:**<br>Cardiovascular Fitness ($VO_2$ peak), walking ability | Over the study period, the intervention was associated with significantly greater improvement in peak $VO_2$ (mL/kg/min): 3.9 (95% CI 2.1-5.7) vs. |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
|---|---|---|---|---|---|
| **Canada**<br><br>**RCT** | Patient ☒<br>Assessor ☑<br><br>ITT: ☑ | ischemic stroke who were able to walk 5 m with or without aids, orthoses or assistance. Mean age was 60 years, 58% were men. Mean time since stroke was 23 days. 20% of patients did not require a walking aid at baseline. | (BWSTT) + usual care (UC)(n=24) vs. UC (n=26). Participants in both groups participated in dose-match sessions that consisted of 60-minute sessions, 5 days/week for 6 weeks, as inpatients, followed by 60-minute sessions, 3 days/week for 6 weeks, as outpatients (48 sessions total) | (6MWT, gait speed).<br><br>**Secondary outcome:** Functional balance (Berg Balance Scale), Chedoke McMaster Stages of Recovery (CMSR) Leg and Foot components, satisfaction with program<br><br>Assessments were conducted at baseline, following treatment and at 6 and 12-month | 0.5 (95% CI −1.0 to 2.00, p=0.004 and 6MWT (m): 98.0 (95% CI 62.9-133.1) vs. 46.2 (95% CI 13.5-78.9), p=0.015.<br><br>There were no significant differences between groups in gait speed (m/s), BBS scores, or CMSR (leg); however, the intervention was associated with significantly greater improvement in CMSR (foot): 1.5 (95% CI 0.8-2.2) vs. 0.7 (95% CI 0.0-1.4), p=0.010.<br><br>There were 5 dropouts/losses to follow-up. |
| **Globas et al. 2012**<br><br>**Switzerland**<br><br>**RCT** | CA: ☒<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☑ | 38 patients with residual hemiparetic gait >6 months after stroke. Mean age was 69 years, 76% were men. Mean time since stroke was 65 months. | Patients were randomized to receive 3 months (30-50 min 3x/week) progressive graded, high-intensity aerobic treadmill exercise (TAEX) or conventional care physiotherapy (tone-regulating exercises for upper and lower extremities). At the end of the intervention period, control participants crossed over and received TAEX.<br><br>Assessments were conducted at baseline, post intervention and at 12 months. | **Primary outcomes:** Peak exercise capacity ($Vo_{2\ peak}$) and the 6-minute walk test (6MWT).<br><br>**Secondary outcomes:** Gait velocity (10-m walk), 6MWT, Berg Balance Scale (BBS), functional leg strength (5 chair-rise), self-rated mobility (Rivermead Mobility Index), and quality of life (SF-12). | Mean ± sd $Vo_{2peak}$ (mL/kg/min) at baseline and 3 months<br>TAEX group: 18.9 ± 4.6 to 24.4 ± 6.6<br>Control group: 21.7 ± 7.8 to 20.9 ± 8.9<br>Mean difference between groups at crossover: 5.5 vs. -0.8 mL/kg/min, p<0.001<br><br>Mean ± sd 6MWT (m) at baseline and 3 months<br>TAEX group: 274.4 ± 113 to 332.1 ± 138<br>Control group: 261.2 ± 177 to 265.9 ± 189<br>Mean difference between groups at crossover: 58 vs. 4.7, p<0.001.<br><br>Mean ± sd 10 m walk (comfortable speed) m/s at baseline and 3 months<br>TAEX group: 0.73 ± 0.28 to 0.79 ± 0.29<br>Control group: 0.70 ± 0.44 to 0.70 ± 0.46<br>p=ns at crossover<br><br>Mean ± sd BBS at baseline and 3 months<br>TAEX group: 49.3 ± 6.5 to 51.1 ± 6.4<br>Control group: 45.2 ± 11.0 to 0.70 ± 0.46<br>p<0.05<br><br>There were 4 dropouts. Adverse events included 1 recurrent stroke and 2 fractures unrelated to |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
|---|---|---|---|---|---|
| | | | | | study. |
| **Jin et al. 2012**<br><br>**China**<br><br>**RCT** | CA: ☑<br><br>Blinding:<br>Patient ☒<br>Assessor ☑<br><br>ITT: ☒ | 133 patients recruited from a rehabilitation centre with chronic hemiparesis who were independent ambulators (with or without an aid). Mean age was 57 years, 71% were men. Mean time since stroke was 18 months. | Patients were randomized to either an exercise training group (n=68) and received 40 minutes of aerobic cycling exercise, with lower extremity weights, at a target intensity of 50-70% heart rate reserve, 5 days a week for 8 weeks, or a control group (n=65) that received low intensity overground walking training at a target heart rate of 20-30% heart rate reserve. Both groups received balance training (30 minutes) and stretching exercises (20 minutes). | **Primary Outcome:**<br>Cardiovascular fitness (peak $VO_2$) and walking ability (6MWT and the Rivermead Mobility Index RMI).<br><br>**Secondary Outcomes:**<br>Berg Balance Scale (BBS), Modified Ashworth Scale (MAS) and Isokinetic dynamometry for isometric knee muscle strength.<br><br>Outcomes were assessed before and after treatment | *Cardiovascular fitness*<br>Mean ± sd peak $VO_2$ L/min before and after treatment:<br>Cycle training group: 0.88 ± 0.14 to 1.13 ± 0.17<br>Control group: 0.87 ± 0.14 to 0.89 ± 0.14<br>p<0.001<br><br>Mean ± sd peak $VO_2$ L/min/kg before and after treatment:<br>Cycle training group: 13.2 ± 0.9 to 16.8 ± 1.0<br>Control group: 13.2 ±1.0. to 13.3 ± 1.0<br>p<0.001<br><br>*Walking ability*<br>Mean ± sd 6MWT (m):<br>Cycle training group: 212 ± 63.5 to 218.5 ± 63.7<br>Control group: 212 ±50.1 to 1213.55 ± 50.6<br>p<0.001<br><br>Mean ± sd RMI<br>Cycle training group: 10.3 ± 1.4 to 210.5 ± 1.7<br>Control group: 10.2 ±1.4 to 10.4 ± 1.6<br>p<0.557<br><br>*Impairment-Level Outcomes*<br>Mean ± sd BBS scores<br>Cycle training group: 47.9 ± 3.1 to 48.6 ± 2.9<br>Control group: 47.4 ± 3.7to 48.3 ± 3.9<br>p<0.228<br><br>Median (IQR) MAS scores<br>Cycle training group: 1 (0-1) to 1 (0-1)<br>Control group: 1 (0-1) to 1 (0-1)<br>p<0.910 |

## Pharmacotherapy and Functional Recovery

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
|---|---|---|---|---|---|
| **Mead et al. 2024**<br><br>**UK**<br><br>**Systematic review & patient-level meta-analysis** | All trials were at low risk of bias. | 3 RCTs (AFFINITY, EFFECTs and FOCUS) that included 5,907 patients with stroke. Mean age was 69.9 years, 63% were men. 94% were independent prior to stroke. Baseline median NIHSS score was 5. | Participants in all trials were randomized 1:1 to receive 20 mg fluoxetine daily or placebo for 6 months. | **Primary outcome:**<br>mRS score at 6 months<br><br>**Secondary outcomes:**<br>mRS scores at 12 months, Stroke Impact Scale sub scores | 99% of patients were enrolled as inpatients a mean of 6.6 days after stroke.<br><br>At 6 months, the distribution of mRS scores did not differ significantly between groups (common OR=0·96, 95% CI 0.87 to 1.05). GRADE: high quality. Neither was the distribution of scores significantly different between groups at 12 months (common OR=0.98, 95% CI 0.89 to 1.07).<br><br>There were no significant differences between groups in SIS subscores (motor, physical function).<br><br>Fluoxetine was associated with a significantly increased frequency of seizures (2.64% vs. 1.8%, p=0.03), falls with injury (6.26% vs 4.51%, p=0·03), and fractures (3.15% vs 1.39%, p=0.01).<br><br>The frequency of new onset depression was significantly lower in the fluoxetine group. (10.05% vs 13.42%, p<0.0001). |
| **Legg et al. 2021**<br><br>**UK**<br><br>**Cochrane review** | Pooled analyses were conducted using data from 6 trials, assessed as being at low risk of bias across all domains. | 76 RCTs including 13,029 participants who had suffered a stroke within the previous 12 months. In 37 trials, depression was an inclusion criterion. The mean age ranged from 51 to 75.6 years with most studies recruiting participants in their 60s. Men outnumbered women in most trials. | Trials compared SSRIs vs. placebo. Agents included fluoxetine (n=38), sertraline (n=8), paroxetine (n=13), citalopram (n=9), escitalopram (n=5), citalopram or fluoxetine (n=2) and sertraline or fluoxetine (n=1).<br><br>Time since stroke was 0-90 days (n=44), 3-6 months (n=4), 6-9 | **Primary outcome:**<br>Disability scores at the end of treatment, independence (mRS 0-2) at the end of treatment.<br><br>**Secondary outcomes:**<br>Neurological deficit, depression, death, adverse events | There was no difference between groups in measures of disability (SMD=0.0, 95% CI -0.5 to 0.5, 5 trials, n=5,436; GRADE: high).<br><br>SSRIs were not associated with a higher chance of being independent (RR=0.98, 95% CI 0.93 to 1.03, 5 trials, n=5,926; GRADE: high).<br><br>SSRIs were associated with significantly lower depression scale scores (SMD=-0.14, 95% CI -0.19 to -0.08, 4 trials, n=5,356; GRADE: high).<br><br>SSRIs were not associated with a significantly higher risk of death (RR=1.01, 95% CI 0.82 to |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | months (n=2) and in the remaining trials, time since stroke was not reported.<br><br>Data on doses and duration of treatment are not summarized. | | 1.24, 6 trials, n=6,080; GRADE: moderate)<br><br>SSRIs were associated with significantly higher risk of seizures (RR=1.4, 95% CI 1.00 to 1.98, 6 trials, n=6,090; GRADE: moderate) and bone fractures (RR=2.35, 95% CI 1.62 to 3.41, 6 trials, n=6,080; GRADE: high). |
| **EFFECTS Trial Collaboration 2020, Lundström et al. 2021, Tay et al. 2023**<br><br>**Sweden**<br><br>**RCT**<br>***The Efficacy oF Fluoxetine—a randomisEd Controlled Trial in Stroke (EFFECTS) trial*** | CA: ☒<br><br>Blinding:<br>Patient ☑<br>Therapist ☑<br>Assessor ☑<br><br>ITT: ☑ | 1,500 participants recruited from 35 hospitals in Sweden with a recent acute stroke in the previous 2–15 days and at least one persisting focal neurological deficit. Mean age was 71 years, 62% were men. 96.5% were independent pre stroke. Median NIHSS score was 3. At baseline, no patients had ongoing depression. | Participants were randomized 1:1 to receive 20 mg fluoxetine daily or placebo for 6 months. | **Primary outcome:**<br>mRS scores at 6 months<br><br>**Secondary outcomes:**<br>6-month survival, depression (new diagnosis-not reported how assessed), cognition (MoCA) NIHSS score<br><br>**Safety outcomes:**<br>New stroke, SIS scores, acute coronary events, upper gastrointestinal hemorrhage, new bone fractures, epileptic seizures, hyponatraemia, all assessed at 6 months | The median duration of treatment was 180 days.<br><br>1,338 (89%) patients took the study medication for at least 150 days.<br><br>The distribution of mRS scores at 6 months was similar between groups (common OR=0·94, 95% CI 0·78–1·13).<br><br>There were no significant differences between the groups in median SIS domain scores except for memory, in which the placebo group had significantly higher scores (92.6 vs. 89.3, p=0.0064) and mood and emotional control, in which the scores were higher in the fluoxetine group (80.6 vs. 76.4, p=0.0002).<br><br>There were 25 (3%) deaths in the duloxetine group vs. 23 (3%) in the placebo group (p=0.66).<br><br>New onset depression was diagnosed less frequently in the fluoxetine group (7% vs. 11%, p=0.015). There were no other significant differences between groups in any of the other secondary outcomes.<br><br>Hyponatremia was more common in the fluoxetine group (11 [1%] 1 [<1%], p=0.0038), as were fractured bones (28 [4%] 11 [2%], p=0.0058). There were no other significant differences between groups in any of the other safety outcomes. |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | | | *12-month outcomes*<br>The distribution of mRS scores at 12 months was similar between groups (adjusted common OR=0.92, 95% CI 0.76–1.10).<br><br>There were no significant differences between groups on any of the SIS domains, including mood and emotional control except for memory, in which the placebo group had significantly higher scores (93 vs. 89, p=0.0021) and communication, in which the scores were higher in the placebo group (96 vs. 93, p=0.024).<br><br>Except for death (5 in each group), 12-month safety data were not reported.<br><br>*Depression outcomes (Tay 2023)*<br>Montgomery–Åsberg Depression Rating Scale (MADRS) was administered at baseline and 6 months.<br><br>There was no significant difference between groups in mean total MADRS scores or depression subscores between groups at 6 months. Apathy subscores increased significantly in both groups from baseline, with significantly greater increases in scores in the fluoxetine group. |
| **AFFINITY Trial Collaboration 2020, Hankey et al. 2021, Almeida et al.2021**<br><br>**Australia**<br><br>**RCT**<br>***Assessment oF FluoxetINe In*** | CA: ☒<br><br>Blinding:<br>Patient ☑<br>Therapist ☑<br>Assessor ☑<br><br>ITT: ☑ | 1,280 participants recruited from 43 hospitals in 3 countries (Australia, New Zealand, Vietnam) with a recent acute stroke in the previous 2–15 days and with an mRS score of ≥1. Mean age was 63 years, 63% were men. Median NIHSS score was 6. At baseline, 32 patients were identified with | Participants were randomized 1:1 to receive 20 mg fluoxetine daily or placebo for 6 months. | **Primary outcome:**<br>mRS scores at 6 months.<br><br>**Secondary outcomes:**<br>6-month survival, depression (change in PHQ-9 score from baseline and PHQ-9 score ≥15), cognition (Telephone Interview for Cognitive Status [TICS] score), Stroke Impact Scale | The mean duration of the trial was 167 days.<br><br>108 persons in the fluoxetine group had discontinued the medication vs. 100 in the placebo group.<br><br>The distribution of mRS scores at 6 months was similar between groups (common OR=0·94, 95% CI 0·76–1·15). There were no significant differences in proportions between groups when mRS scores were dichotomized (0–2 vs 3–6). |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| ***sTroke recovery (AFFINITY)*** | | depression, of whom 10 were taking a non-SSRI medication. | | scores (SIS), health related quality of life (EQ-5D-5L), new diagnosis of depression requiring treatment with antidepressants, and trial medication adherence and cessation. | There were no significant differences between groups in the proportions of persons with new onset depression, those starting on an antidepressant medication, or those with PHQ-9 scores ≥15.<br><br>The median TICS score was 24 in both groups.<br><br>Median SIS scores were similar in all domains except mood and emotional control, in which the scores were higher (better) in the fluoxetine group (80.6 vs. 77.8, p=0.0028).<br><br>The median HQ-5D-L scores in each group were not significantly different (0.81 vs. 0.78).<br><br>There were 15 deaths in each group.<br><br>The frequencies of epileptic seizures, falls with injuries and bone fractures were all significantly higher in the fluoxetine group (2-3% vs. ≤1%).<br><br>*12-month outcomes*<br>The distribution of mRS scores at 12 months was similar between groups (common OR=0·93, 95% CI 0·76–1·14).<br><br>There was no significant difference in the frequency of epileptic seizures (1.71% vs. 1.25%, p=0.65), falls with injury (4.21% vs. 2.35%, p=0.08) or new bone fractures (3.58% vs. 1.72%, p=0.054).<br><br>*Depression outcomes (Almeida et al.2021)*<br>At 26 weeks, the proportion of participants with PHQ-9 scores ≥9 was not significantly different between the groups (20.2% [fluoxetine] vs. 21.1% [placebo]). The proportion with any depression outcome including antidepressant |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | | | use or nonpharmacologic treatment was not significantly different between groups (24.0% vs. 25.4%).<br><br>A significantly lower proportion of participants in the fluoxetine group reported a clinician had diagnosed them with depression (4.3% vs. 7.0%).<br><br>Among persons with PHQ-9 scores of <9 at baseline, there were no significant differences between groups for any of the depression outcomes. |
| **Mead et al. 2020**<br><br>**UK**<br><br>**Systematic review &meta-analysis** | 4 trials were assessed as having a low risk of bias | 13 RCTs (n=4,145) including persons with/without a mood disorder at randomization who were treated with fluoxetine within the first year of stroke.<br><br>This review was an extension of the 2012 Cochrane review, and includes the results of the FOCUS trial | Trials compared any dose of fluoxetine, any mode of delivery, given for any duration vs. placebo or usual care. No co-treatments were permitted.<br><br>Doses were 20 mg (n=12), 30 mg (n=1). Duration of therapy was single dose (n=1), 1 month (n=1) 2 months (n=2), 3 months (n=8), and 6 months (n=1) | **Primary outcomes:** Independence (mRS 0-2) and disability<br><br>**Secondary outcomes:** independence and disability at the end of follow-up. Neurological score, depression, anxiety, cognition, death, motor scores, adverse events (at the end of treatment and/or at the end of follow-up) | There was no difference in the proportion of patients who were independent at the end of treatment (36·6% fluoxetine vs 36·7% control; RR= 1·00, 95% CI 0·91 to 1.09, p=0·99, s trials included).<br><br>There was no significant difference between groups in measures of disability (SMD 0.05, 95% CI -0.02 to 0.12, p=0.15, 7 trials included).<br><br>Fluoxetine was associated with better neurological scores (SMD -0.28, 95% CI -0.42 to -0.14 p=<0.001, n=8 trials), better depression scores (SMD -0.16, 95% CI -0.23 to -0.09, p<0.0001, n=6 trials), fewer diagnoses of depression (RR=0.77, 95% CI 0.65 to 0.90, p=0.001, n=2 trials), but more seizures (3.9% vs 2.6%, RR 1.49, 95% CI 1.05 to 2.11, p=0.03, n=7 trials) |
| **Dennis et al. 2019**<br><br>**UK**<br><br>**RCT**<br>***Fluoxetine Or Control Under*** | CA: ☑<br><br>Blinding:<br>Patient ☑<br>Assessor ☑<br><br>ITT: ☒ | 3,127 patients recruited from 103 hospitals, ≥18 years with a clinical diagnosis of stroke, who were enrolled between 2 days and 15 days post onset. Mean age was 71 | Patients were randomized 1:1 to receive 20 mg fluoxetine or placebo orally once daily for 6 months. | **Primary outcome:** (ordinal) mRS scores at 6 months<br><br>**Secondary outcomes:** Survival at 6 and 12 months, mRS scores at functional status at 12 Stroke Impact | There was no significant difference between groups in the distribution of mRS scores (common OR= 0·951, 95% CI 0·839–1·079, p=0·439), nor was there a significant difference in proportions when mRS scores were dichotomized (0–2 vs. 3–6). There were no significant differences between groups based on all subgroup analyses. |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| ***Supervision (FOCUS) trial*** | | years, 61% were men. | | Scale scores at 12 months, Mental Health Inventory (MHI-5), the Vitality subscale of SF3 and the EuroQoL-5 Dimensions-5 Levels (EQ5D-5L) | A lower percentage of patients in the fluoxetine group were likely to be diagnosed with new depression (13·4% vs. 17.2%; difference in proportions of 3·78%, 95% CI 1·26–6·30, p=0·0033).<br><br>Median MHI-5 scores were significantly higher in the fluoxetine group (76 vs. 72, p=0·0100).<br><br>There were no significant differences in any other secondary outcomes.<br><br>The risk of bone fractures was significantly higher in the fluoxetine group 2·88% vs.1·47%, p=0·0070), as were the number of epileptic seizures (3.8% vs. 3.5%, p=0.03).<br><br>*12-month outcomes*<br>The distribution of mRS scores between groups was not significantly different, nor was there a significant difference in proportions when mRS scores were dichotomized (0–2 vs. 3–6).<br><br>There were no significant differences between groups in survival, median SIS scores, MHI-5, EQ5D-5L, or new onset depression. |
| **Chollet et al. 2011**<br><br>**France**<br><br>**RCT**<br>***Fluoxetine for motor recovery after acute ischaemic stroke (FLAME)*** | CA: ☑<br><br>Blinding:<br>Patient ☑<br>Therapist ☑<br>Assessor ☑<br><br>ITT: ☒ | 118 patients aged 18-85 years, free from clinical depression and not taking any anti-depressant medication enrolled within 5 to 10 days of stroke with Fugl-Meyer Motor Scale (FMMS) scores of <55. Mean age was 65 years, 61% were men. Patients with current or recent (within the last month) depression, treated with an SSRI, were excluded. | A mean of 9 days after stroke, participants were randomized 1:1, 5-10 days post-stroke to receive fluoxetine (20 mg/day) or placebo for 90 days. All participants received physiotherapy and standard inpatient stroke care during the study period. | **Primary outcome:**<br>FMMS scores at day 90.<br><br>**Secondary outcomes:**<br>NIHSS, modified Rankin Scale, and the Montgomery Asberg Depression Ration Scale at 90 days. | At the end of the 90-day treatment period, participants who received fluoxetine demonstrated significantly greater mean improvement on the FMMS, controlling for centre, age, history of stroke, and baseline FMMS (9.8 points, 95% CI 3.4-16.1, p=0.003).<br><br>Participants who received fluoxetine also demonstrated significantly greater mean improvement on the FMMS upper sub scale scores (9.7 points, 95% CI 3.6-15.9, p=0.02), and the lower sub scale (3.3 points, 95% CI 0.8-5.7, p=0.01).<br><br>Two serious adverse events occurred in the |

| Study/Type | Quality Rating | Sample Description | Method | Outcomes | Key Findings and Recommendations |
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| | | | | | fluoxetine group (hyponatraemia and partial seizure). Transient digestive disorders (nausea, diarrhea, and abdominal pain) were more common in the active treatment group (25% vs. 11%).<br><br>There were 2 dropouts in the fluoxetine group and 3 in the placebo group. |

**Abbreviations**

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| ABC scale: Activities-specific Balance Confidence Scale | ADL: Activities of Daily Living |
| BBS: Berg Balance Scale | CA: Concealed Allocation |
| CI: Confidence Interval | FMA-LE: Fugl Meyer Assessment – Lower extremity motor subscale |
| ITT: Intention to treat | N/A: Not Assessed |
| OR: Odds Ratio | PEDro: Physiotherapy Evidence database |
| RCT: Randomized Controlled Trial | RMI: Rivermead Mobility Index |
| ROB: Cochrane Risk of bias tool | ROM: Range of Motion |
| SMD: Standardized Mean Difference | 6MWT: 6 Minute Walk Test |
| TUG: Timed-up & Go | |

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