Repetitive task training for improving functional ability after stroke (Review)

French B, Thomas LH, Leathley MJ, Sutton CJ, McAdam J, Forster A, Langhorne P, Price CIM, Walker A, Watkins CL, Connell L, Coupe J, McMahon N

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[Intervention Review]

Repetitive task training for improving functional ability after stroke

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ABSTRACT

Background

The active practice of task-specific motor activities is a component of current approaches to stroke rehabilitation.

Objectives

To determine if repetitive task training after stroke improves global, upper or lower limb function, and if treatment effects are dependent on the amount, type or timing of practice.

Search methods

We searched the Cochrane Stroke Trials Register (October 2006), The Cochrane Library, MEDLINE, EMBASE, eight additional electronic databases (to September 2006), and OT search (to March 2006). We also searched for unpublished/non-English language trials, conference proceedings, combed reference lists, requested information on bulletin boards, and contacted trial authors.

Selection criteria

Randomised/quasi-randomised trials in adults after stroke, where the intervention was an active motor sequence performed repetitively within a single training session, aimed towards a clear functional goal, and where the amount of practice could be quantified.

Data collection and analysis

Two authors independently screened abstracts, extracted data and appraised trials. Assessment of methodological quality was undertaken for allocation concealment, blinding, loss to follow up and equivalence of treatment. We contacted trial authors for additional information.

Main results

Fourteen trials with 17 intervention-control pairs and 659 participants were included. Primary outcomes: results were statistically significant for walking distance (mean difference (MD) 54.6, 95% CI 17.5 to 91.7); walking speed (standardised mean difference (SMD) 0.29, 95% CI 0.04 to 0.53); sit-to-stand (standard effect estimate 0.35, 95% CI 0.13 to 0.56); and of borderline statistical significance for functional ambulation (SMD 0.25, 95% CI 0.00 to 0.51), and global motor function (SMD 0.32, 95% CI -0.01 to 0.66). There were no statistically significant differences for hand/arm function, or sitting balance/reach. Secondary outcomes: results were statistically significant for activities of daily living (SMD 0.29, 95% CI 0.07 to 0.51), but not for quality of life or impairment measures. There was no evidence of adverse effects. Follow-up measures were not significant for any outcome at six or 12 months. Treatment effects were not modified by intervention amount or timing, but were modified by intervention type for lower limbs.

Authors' conclusions

Repetitive task training resulted in modest improvement in lower limb function, but not upper limb function. Training may be sufficient to impact on daily living function. However, there is no evidence that improvements are sustained once training has ended. The review potentially investigates task specificity rather more than repetition. Further research should focus on the type and amount of training, and how to maintain functional gain.

PLAIN LANGUAGE SUMMARY

Repetitive task training for improving functional ability after stroke

Stroke can cause problems with movement, often down just one side of the body. All limbs can be affected, and while some recovery is common over time, about one third of people will have continuing problems. This review of 14 studies with 659 participants looked at whether repeated practice of tasks similar to those commonly performed in daily life could improve functional abilities. In comparison with usual care or placebo groups, people who practiced functional tasks showed modest improvements in walking speed, walking distance and the ability to stand from sitting, but improvements in leg function were not maintained six months later. Repetitive task practice had no effect on arm or hand function. There was a small amount of improvement in ability to manage activities of daily living. Training effects were no different for people whether early or late after stroke. Further research is needed to determine the best type of task practice, and whether more sustained practice could show better results.

BACKGROUND

Description of the condition

Although the age-related incidence of stroke may be falling (Rothwell 2004), stroke is still the major cause of long-term neurological disability in adults (Wolfe 2000). Prevalence rates of disability and impairment vary according to sampling of cohorts, but in the acute stage of stroke approximately half of all stroke survivors are left with severe functional problems (Lawrence 2001). Only 5% to 20% of people with initial upper limb impairment after stroke fully regain arm function, with 30% to 66% regaining no functional use at six months (Heller 1987; Nakayama 1994; Sunderland 1989; Wade 1983). At three weeks and six months after stroke, 40% and 15% of people are unable to walk independently indoors (Wade 1987), with only 18% regaining unrestricted walking ability (Lord 2004).

Description of the intervention

Systematic reviews of treatment interventions for the paretic upper limb suggest that participants benefit from exercise programmes in which functional tasks are directly trained, with less benefit if the intervention is impairment focussed, for example muscle strengthening (Van Peppen 2004). A recent meta-analysis (Kwakkel 2004) also showed that more intensive therapy may at least improve the rate of activities of daily living (ADL) recovery, particularly if a direct functional approach is adopted (Kwakkel 1999; Van der Lee 2001). Repetitive task practice combines elements of both intensity of practice and functional relevance.

How the intervention might work

Many aspects of rehabilitation involve repetition of movement. Repeated motor practice has been hypothesised to reduce muscle weakness and spasticity (Feys 1998; Nuyens 2002), and to form the physiological basis of motor learning (Butefisch 1995), while sensorimotor coupling contributes to the adaptation and recovery of neuronal pathways (Dobkin 2004). Active cognitive involvement, functional relevance and knowledge of performance are hypothesised to enhance learning (Carr 1987).

Why it is important to do this review

There are a number of completed trials comparing functional task practice against other forms of therapy in stroke rehabilitation, and a number of ongoing trials. Repetitive task training (RTT) has the potential to be a resource efficient component of stroke rehabilitation, including delivery in a group setting, or self-initiated practice in the home environment. Repetition of movement is also the basic mechanism of action associated with the mechanical or robotic devices currently being developed to assist and increase motor activity. This review considers if RTT can lead to sustainable functional gains.

OBJECTIVES

The primary objective of the review was to determine if RTT improves functional ability in adults after stroke in:

(1) upper limb function/reach;

(2) lower limb function/balance;

(3) global motor function.

The secondary objectives were as follows.

(1) To determine the effect of RTT on secondary outcome measures of:

(a) ADL function;

(b) motor impairment;

(c) quality of life/health status measures;

(d) adverse outcomes.

(2) To determine the factors that could influence primary and secondary outcome measures, including the effect of:

(a) 'dose' of task practice;

(b) type of task (whole or pre-task movement);

(c) timing of intervention;

(d) type of intervention.

METHODS

Criteria for considering studies for this review

Types of studies

We included randomised and quasi-randomised trials (such as those allocating by date or alternation) in the review. One arm of the trial had to include RTT, compared against usual practice (including 'no treatment'), or an attention control group. Examples of attention-control treatment are comparable time spent receiving therapy on a different limb, or participating in an activity with no potential motor benefits. We accepted usual-practice comparison groups when the intervention received by the control group was considered a normal or usual component of stroke rehabilitation practices, including neurophysiological or orthopaedic approaches. We assumed that, early after stroke, usual practice would mean that people would receive some therapy.

Types of participants

Adults (presumably 18 years and older) who have suffered a stroke. Stroke is defined according to the World Health Organization definition as "a syndrome of rapidly developing symptoms and signs of focal, and at times global, loss of cerebral function lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin" (WHO 1989). We included trials starting any time after an acute stroke and in any setting.

Types of interventions

One arm of the trial had to include an intervention where an active motor sequence was performed repetitively within a single training session, and where the practice was aimed towards a clear functional goal. Functional goals could involve complex whole tasks, or pre-task movements for a whole limb or limb segment such as grasp, grip, or movement in a trajectory to facilitate an ADL-type activity. To be included, trials of repetitive activity were required to involve complex multi-joint movement with functional measurement of outcome, rather than the exercise of a single joint or muscle group orientated to motor performance outcomes.

We included any intensity and duration of task training schedule However, we only included trials if the time duration or number of repetitions within a session of practice and the number of sessions delivered could be identified. We included trials that clearly used motor relearning as a whole therapy approach if we could identify the amount of task-specific training received.

We included trials combining RTT with person-delivered, mechanical or robotic movement assistance if the purpose of the assistance was to facilitate a task-related repetition. We excluded studies if assisted movement was predominant, or could not easily be related to a functional goal.

We excluded trials if they combined RTT with another intervention where the influence of task repetition could not be isolated, for example electrical stimulation, virtual environments, performance or biofeedback, forced use, bilateral movement, or mental rehearsal. We also excluded trials if the intervention used mechanical means simply to increase endurance.

We contacted trial authors for clarification of the nature of the intervention if it was unclear whether the trial met our definition.

Types of outcome measures

Primary outcomes

The primary outcomes we chose were global and limb-specific functional measures. Due to the large range of measures used across trials, selection of outcome measures was done by the review authors to facilitate quantitative pooling. If more than one measure was available in an outcome category, measures of functional motor ability used in the primary trials were prioritised as follows in the different categories.

(1) Upper limb function/reach

(a) Arm function: Motor Assessment Scale (MAS) - upper limb component, Action Research Arm Test, Frenchay Arm Test, Wolf Motor Function Test, Functional Test of the Hemiparetic Upper Extremity, Box and Block Test, Southern Motor Group Assessment

(b) Hand function: MAS hand, Jebsen Test of Hand Function*, Peg Test*

(c) Sitting balance/reach: Reaching Performance Scale, Functional Reach

(2) Lower limb function/balance

(a) Lower limb function: walking distance, walking speed, functional ambulation, Timed Up and Go Test/sit to stand*, measures of lower limb function, such as the Rivermead Motor Assessment (RMA), Sodring Motor Evaluation Scale.

(b) Standing balance/reach: Berg Balance Scale, Sitting Equilibrium Index, Standing Equilibrium Index, Functional Reach

(3) Global motor function

Motor Assessment Scale, Rivermead Motor Assessment Scale, Sodring Motor Evaluation Scale

Secondary outcomes

(1) Activities of daily living measures

Barthel Index, Functional Independence Measure (FIM), Modified Rankin Scale, Global Dependency Scale

(2) Measures of task performance or impairment

Motricity Index, Fugl-Meyer Assessment, Sodring Motor Evaluation Scale leg and arm subscales, Trunk Control Test

(3) Measures of quality of life, health status, user satisfaction, carer burden, motivation or perceived improvement

For example, Nottingham Health Profile*, SF36, Dartmouth Cooperative Chart*

(4) Adverse outcome

For example, pain, injury, falls

* Items marked with an asterisk are measures where a low score equals a positive outcome. The data were expressed as negative values for these studies. In all other measures, a high score indicates a good outcome, and data were expressed as positive values.

Timing of outcome assessment

Primary outcome timing was at the end of the treatment period. If the end of the treatment period was not clearly defined, outcome measures at three months post treatment were chosen as primary, because this was considered to be the average period of rehabilitation input. Outcome data are presented for follow up less than six months post treatment, and between six months to one year post treatment.

Search methods for identification of studies

See: 'Specialized register' section in Cochrane Stroke Group

Electronic searches

We searched the Cochrane Stroke Group Trials Register, which was searched by the Review Group Co-ordinator in October 2006, using the Intervention Types: 'Physiotherapy' and 'Occupational Therapy', without restriction of intervention code. We identified 1366 studies in total.

In addition, we searched the following electronic databases: the Cochrane Central Register of Controlled Trials (CENTRAL) (*The Cochrane Library* Issue 3 2006); MEDLINE (1966 to September Week 4, 2006); EMBASE (1980 to Week 40, 2006); CINAHL (1982 to October Week 1, 2006); AMED (1985 to Week 40, 2006); SPORTDiscus (1980 to October Week 1, 2006); ISI Science Citation Index (1973 to 14 October 2006); Index to Theses (1970 to September 2006); ZETOC (to 14 October 2006); PEDro (to 3 October 2006); OT Seeker (to 21 April 2006); OT

Search (to March 2006). We developed a search strategy, in collaboration with the Cochrane Stroke Group Trials Search Co-ordinator, for MEDLINE (Ovid) and we adapted it for the other databases (Appendix 1).

We sought to identify additional non-English language trials by searching Chinese, Russian and Indian databases via Eastview, Panteleimon and Indmed, using broad descriptors for stroke, rehabilitation and physical therapy. We searched The China National Knowledge database in both English and Chinese. Personnel from the Second Military Medical University, Shanghai conducted the searches and translated Chinese articles.

Additional searches

In an effort to identify further published, unpublished and ongoing trials, we undertook the following searches.

(1) We searched the following national and international databases to May 2006: MetaRegister of Controlled Trials, BioMed Central, CRISP, Centerwatch, National Research Register, ReFeR, Stroke Trials Directory, REHABDATA, and CIRRIE, using simple terms for stroke and rehabilitation or physical therapy.

(2) We searched the following physiotherapy, occupational therapy and robotics conference proceedings:

- Australian Physiotherapy Association Conference 2000, 2002, 2004;
- Australian Physiotherapy Association Neurology and Gerontology Physiotherapy Conference: 2005;
- American Physical Therapy Congress Annual Conference 2005;
- Canadian Physiotherapy Conference 2005;
- Chartered Society of Physiotherapy Annual Congress 2000, 2001, 2002, 2003, 2004, 2005;
- ICORR Rehabilitation Robotics International Conferences 1999, 2001, 2005;
- National Association of Neurological Occupational Therapists Conference 2005;
- UK College of Occupational Therapists Conference 2002, 2003, 2005;
- World Confederation for Physical Therapy 1st International Congress 1953, 4th International Congress 1963;
- World Confederation of Physiotherapy Europe: First Congress, Copenhagen 1994: Physiotherapy in Stroke Management.

(3) We searched the reference lists of 27 systematic reviews relevant to physical or occupational therapy in stroke rehabilitation (Barreca 2003; Cifu 1999; Drukker 2001; Duncan 1997; Hakkennes 2005; Hendricks 2002; Hiraoka 2001; Kwakkel 1997; Kwakkel 2004; Legg 2006; Ma 2002; Meek 2003; Ottenbacher 1993; OST 2003; Pollock 2007; Prange 2006; Saunders 2004; Smidt 2005; Steultjens 2003; Steultjens 2005; Stewart 2006; Teasell 2003; Trombly 2002; Van der Lee 2001; Van Dijk 2004; Van Peppen 2004; Walker 2004). We also searched reference lists of publications and literature reviews relevant to RTT identified by the search (Bayona 2005; Carr 1998).

(4) We used the Cited Reference search facility on ISI Web of Knowledge for all included trials.

(5) We posted a request for information to the bulletin boards of World Congress of Physical Therapy and PHYSIO JISCmail and contacted authors to ask for details of any other possibly relevant trials.

Data collection and analysis

Selection of studies

One review author (BF) performed the searches. From the initial references, one review author (BF) excluded 4443 obviously irrelevant references based on title and abstract; this was checked by a second review author (JM). All review authors (BF, JM, ML, LT) undertook screening on the same references until an acceptable level of inter-rater reliability was achieved (kappa = 0.63). From that point, two review authors (from BF, JM, ML, LT) independently screened references.

For non-English language papers, we made decisions about exclusion based on the English abstract or machine translation of the abstract via WorldLingo or Translation Booth, if adequate. If machine translation was inadequate, or inclusion was unclear from English abstracts, the methods section of full papers were commercially translated by native speakers. Sixteen methods sections and three full non-English language papers that were screened as potentially relevant were commercially translated. Two review authors (BF, JM) independently filtered all full papers and methods section translations for non-English papers.

Data extraction and management

All review authors (BF, JM, ML, LT) undertook data extraction and critical appraisal on eight studies. Inter-rater reliability of judgement of seven criteria for quality assessment using unweighted multiple kappa was median kappa = 0.67 (range 0.48 to 0.85). Disagreements were reviewed and instructions for critical appraisal gradings were revised. From that point, two review authors independently conducted data extraction and review of the methodological quality of the eligible trials. Disagreements were resolved by discussion, and referral to a third review author as necessary. We recorded data on a standardised checklist, incorporating details of randomisation method, study population, intervention methods and delivery, reason for losses to follow up, and post-therapy and follow-up outcome measures. In addition, we extracted information relating to treatment monitoring, acceptability and adherence where available.

Assessment of methodological quality

We evaluated items as adequate, inadequate, or unclear for the following criteria.

(1) Selection bias

(a) allocation concealment
(b) baseline comparability of groups

(2) Performance bias

(a) groups treated equally during intervention
(b) groups treated equally during usual care

(3) Attrition bias

(a) description of withdrawals, drop outs, and those lost to follow up
(b) all participants entering trial accounted for

(4) Detection bias

(a) blinding of outcome assessors.

Measures of treatment effect

For continuous outcomes using similar measurement scales, we used the mean difference (MD) with 95% confidence intervals (CI). If similar outcomes were measured using different outcome scales, we combined results using standardised mean difference (SMD) and 95% CI. For continuous outcomes, we extracted means and standard deviations of post-therapy scores. We also extracted means and standard deviations of change from baseline scores where available across trials.

One outcome (Comparison 04.04: Sit to stand: post treatment/change from baseline) contained both dichotomous and continuous measurement units, which we analysed using the generic inverse variance method. Four different outcome measures were used in seven trials. Three of these were continuous measures: Timed Up & Go Test (Blennerhassett 2004b; Dean 2000; Salbach 2004a); Motor Assessment Scale sit-to-stand (Van Vliet 2005; Langhammer 2000); sit-to-stand (time in seconds (Howe 2005), the exception being 'Number of people able to stand independently and safely on two consecutive occasions' (Barreca 2004). For the six trials with continuous outcomes, the SMD and corresponding standard error were calculated in the Cochrane Review Manager software, RevMan 4.2, from the SMD estimate and CI and re-entered for the GIV-based meta-analysis of sit-to stand. For Barreca 2004, we converted the log OR and its standard error to an approximate SMD scale.

Unit of analysis issues

Studies with multiple treatment groups

Two trials (Blennerhassett 2004; Salbach 2004) compared upper versus lower limb training, so are included as four intervention-control pairs. Blennerhassett 2004a refers to a upper limb training group versus lower limb attention control, and Blennerhassett 2004b refers to an lower limb training group versus upper limb training attention control. Salbach 2004a refers to a lower limb training group versus upper limb training attention control, and Salbach 2004b refers to the upper limb training group versus lower limb training attention control. In the subgroup and sensitivity analyses, these intervention-control pairs are not included as separate trials, as it was considered that the impacts of the interventions on upper and lower limb function in the same person might not be completely independent. Results for primary outcome of the lower limb training groups were selected as representative, as studies were showing that treatment effects were greater in the lower limb than in the upper limb. One trial (Kwakkel 1999) compared upper and lower limb training groups against the same control group. To avoid the control group being included twice, and to use a limb-specific rather than a global or ADL measure, the lower limb training versus splint control comparison was selected for the sensitivity analyses.

Dealing with missing data

If data were not in a form suitable for quantitative pooling, we contacted trial authors for additional information .We attempted to obtain post-therapy scores from trial authors who had reported median and inter-quartile ranges. Trials reporting change scores with standard deviations are presented in separate analyses.

Assessment of heterogeneity

The degree of heterogeneity among the trials was assessed by the I-squared (I^2) statistic for each outcome. If less than or equal to 50%, we used a fixed-effect meta-analysis. If the I^2 statistic was greater than 50%, we explored the individual trial characteristics to identify potential sources of heterogeneity. We then performed meta-analysis using both fixed-effect and random-effects modelling to assess sensitivity to the choice of modelling approach.

We addressed clinical and methodological diversity by incorporating subgroup or sensitivity analyses for type of participant (time from stroke), intervention (type and amount of intervention), and study design (comparison group, equivalence of treatment).

To test for subgroup effects we used the chi-squared test with a 10% significance level.

Assessment of reporting biases

We checked the assessment of the potential for reporting bias by funnel plot of number of trial participants and effect size for all trials.

Subgroup analysis and investigation of heterogeneity

We undertook planned subgroup analyses for all primary outcomes separately for upper limb and lower limb function, due to the potential differential impact (Table 1). Planned subgroup analyses were as follows:

(1) dosage of task practice: dosage of task practice was calculated by multiplying number of weeks, by number of sessions per week, by the session duration in hours. Trials were divided into those providing up to and including 20 hours training, and those providing more than 20 hours training in total;

(2) time since stroke: mean time since stroke at recruitment was used to classify trials as within zero to six months post-stroke or more than six months post-stroke. As a number of trials recruited very early post-stroke, a post-hoc analysis grouping was included for trials recruiting within 14 days of stroke;

(3) type of intervention: trials were classified as either (a) whole therapy approaches, where rehabilitation in total was directed by a motor relearning or movement science approach, (b) mixed functional task training, where therapy included a mixed combination of functional tasks, and (c) single task training, where one task was practiced repeatedly.

We intended to consider if effect sizes were related to whether training was based on pre-functional versus functional activities, or pre-intervention level of disability. In the event, most pre-functional trials were excluded because they contained a large proportion of passive or active-assisted movement, and levels of disability proved too difficult to classify because of mixed groups of participants and unsuitable measures and data for this purpose. Therefore, we have not presented these planned subgroup analyses.

Outcomes for subgroup analyses were prioritised by the authors' primary outcome choice, or the review authors' judgement as to the most suitable measure for the intervention, for example a balance measure for trials training balance functions. If more than one measure was available, lower limb outcomes were prioritised in the following order: (1) walking speed, (2) walking distance, (3) functional ambulation, and (4) lower limb functional measures; and upper limb outcomes were prioritised to (1) arm function, and (2) hand function. One trial (Barreca 2004) is omitted from the subgroup and sensitivity analyses because it used a dichotomous outcome. We excluded this trial from these analyses rather than using generic inverse variance for all 14 trials, because SMD is easier for clinicians to interpret.

Sensitivity analysis

We carried out planned sensitivity analyses for allocation concealment (adequate or inadequate/unclear). In addition, we included post hoc sensitivity analyses to consider the impact of different comparison groups (attention control, usual care), and equivalence of therapy time (equivalent time, additional time). We did not undertake planned sensitivity analyses for intervention delivery (therapist versus self-administered, group versus individual) and intervention setting (home versus community) because of insufficient numbers of trials.

RESULTS

Description of studies

Results of the search

Overall, we identified 1366 studies from the Cochrane Stroke Group trials register and 18,241 bibliographic references from the main database searches, totalling 19,607. We identified a further 772 items from unpublished trial databases, conference proceedings, and hand and citation searching, totalling 20,379. After removal of duplicates, 14,978 items progressed to filtering.

We identified 447 items considered potentially relevant from filtering and retrieved the full papers, including 71 items in languages other than English. Out of the 447 full papers retrieved, we excluded 223 as not relevant, and we categorised the remaining 224 papers as potentially relevant and progressed to more detailed filtering.

All of the 14 studies finally selected for inclusion in the review were identified from the Cochrane Stroke Group trials register. Of the seven ongoing studies, one was identified from the Cochrane Stroke Group trials register, four from handsearching, one from author contact and one from secondary referencing. Of the 17 studies still awaiting assessment (because of insufficient detail to judge inclusion), six were identified from the Cochrane Stroke Group trials register, nine from handsearching, and two from database searching.

Included studies

We identified 14 trials, comprising 17 intervention-control pairs, which met the inclusion criteria. One paper (Kwakkel 1999) refers to a trial with two intervention-control pairs which have been referenced separately in the review: Kwakkel 1999a refers to a lower limb training group versus splint control, Kwakkel 1999b refers to an upper limb training group versus splint control. Blennerhassett 2004 also includes two intervention-control pairs: Blennerhassett 2004a refers to an upper limb training group versus lower limb attention control, and Blennerhassett 2004b refers to a lower limb training group versus upper limb training attention control. Salbach 2004 also has two intervention-control pairs: Salbach

2004a refers to a lower limb training group versus upper limb training attention control, and Salbach 2004b refers to the upper limb training group versus lower limb training attention control. In one trial (Winstein 2004) there were three arms, consisting of a functional task practice group, a strength training group and a usual care group. Only the data for the intervention-control pair of functional task practice versus control are included here, as the strength training group was considered to be an alternative intervention so the comparison did not meet our inclusion criteria.

Design

Of the 14 included trials, 13 are randomised controlled trials (Barreca 2004; Blennerhassett 2004; Dean 1997; Dean 2000; de Sèze 2001; Howe 2005; Kwakkel 1999; Langhammer 2000; McClellan 2004; Salbach 2004; Van Vliet 2005; Winstein 2004; Yen 2005), and one is a quasi-randomised trial (Turton 1990). Four of the trials were identified as pilot randomised controlled trials (Dean 2000; de Sèze 2001; Howe 2005; Winstein 2004). Three of the trials were multicentre (Howe 2005; Kwakkel 1999; Salbach 2004). Three of the trials were stratified before randomisation: one for baseline level of walking deficit (Salbach 2004); one for gender and side of stroke (Langhammer 2000); and one for severity of deficit (Winstein 2004).

Sample size

Four trials had 25 participants or less (Dean 1997; Dean 2000; de Sèze 2001; Turton 1990). Five trials had between 25 and 49 participants (Barreca 2004; Blennerhassett 2004; Howe 2005; McClellan 2004; Yen 2005). Five trials had 50 participants or more (Kwakkel 1999; Langhammer 2000; Salbach 2004; Van Vliet 2005; Winstein 2004).

Setting

Of the 14 trials, three were carried out in Canada (Barreca 2004; Dean 2000; Salbach 2004), three in Australia (Blennerhassett 2004; Dean 1997; McClellan 2004), three in the UK (Howe 2005; Turton 1990; Van Vliet 2005), one in Taiwan (Yen 2005), one in the USA (Winstein 2004), one in the Netherlands (Kwakkel 1999), one in Norway (Langhammer 2000) and one in France (de Sèze 2001).

Participants

The 14 trials included 680 participants, of which 659 were included in the 17 intervention-control pairs relevant to this review. All of the trials included both genders, with three trials having more than 60% male participants (Barreca 2004; Dean 1997; Salbach 2004). In two trials, the participants had a mean age of less than 60 (Blennerhassett 2004; Turton 1990), and in five trials the mean age was over 70 (Howe 2005; Langhammer 2000; McClellan 2004; Salbach 2004; Van Vliet 2005).

Six trials included only participants after a first stroke (Dean 2000; de Sèze 2001; Kwakkel 1999; Langhammer 2000; Winstein 2004; Yen 2005). Three trials included participants with either first or recurrent stroke (Blennerhassett 2004; Salbach 2004; Van Vliet 2005). In the remaining trials, it was unclear whether inclusion was limited to first stroke only.

Mean time since stroke

Three trials recruited within 14 days of stroke (Kwakkel 1999; Langhammer 2000; Van Vliet 2005). A further four trials recruited within the first month post stroke (Barreca 2004; de Sèze 2001; Howe 2005; Winstein 2004). One trial recruited within three months of stroke (Blennerhassett 2004). Two trials recruited within six months of stroke (McClellan 2004; Turton 1990). Two trials recruited within 12 months of stroke (Salbach 2004; Yen 2005), and two trials recruited participants in the chronic phase of stroke (Dean 1997; Dean 2000).

Interventions

Trials were divided into whole therapy approaches such as motor relearning or movement science approaches, limb-specific mixed task training or single task training. Two trials described using whole therapy motor approaches (Langhammer 2000; Van Vliet 2005). Four trials trained single tasks - all related to balance, reach or sit to stand (Barreca 2004; Dean 1997; de Sèze 2001; Howe 2005). The remaining trials consisted of limb-specific mixed functional task training. Of these, three used a circuit training approach (Blennerhassett 2004; Dean 2000; Salbach 2004). While all of the remaining trials included some functional task practice, this was sometimes mixed with other components, including: strengthening exercise and treadmill training (Kwakkel 1999a); upper limb exercise (Turton 1990); lower limb exercise (McClellan 2004); and shaping training (Yen 2005).

Of the 17 intervention-control pairs relevant to this review, four were lower limb or mobility training (Blennerhassett 2004b; Dean 2000; Kwakkel 1999a; Salbach 2004a). One trained sit-to-stand movements (Barreca 2004), two trained balance in sitting and standing (de Sèze 2001; Howe 2005), one trained functional reach in sitting (Dean 1997), and one trained standing balance and mobility (McClellan 2004). Six intervention-control pairs were upper limb training (Blennerhassett 2004a; Kwakkel 1999b; Salbach 2004b; Turton 1990; Winstein 2004; Yen 2005). Two intervention-control pairs used whole therapy approaches, training global function (Langhammer 2000; Van Vliet 2005).

Setting

Four trials were carried out solely in an inpatient setting (Barreca 2004; Blennerhassett 2004; de Sèze 2001; Howe 2005); four trials included both inpatient and outpatient care (Kwakkel 1999; Langhammer 2000; Van Vliet 2005; Winstein 2004), four trials were carried out in outpatient or community settings (Dean 1997; Dean 2000; Salbach 2004; Yen 2005), and two trials were in the home environment (McClellan 2004; Turton 1990). In three trials, the intervention was additional to usual care, of which two were during inpatient rehabilitation (Howe 2005; Winstein 2004), and one was after discharge from inpatient therapy, but additional to outpatient therapy (Turton 1990).

Amount of task practice

The number of hours training varied considerably across the interventions. Three trials were estimated to have provided less than 10 hours training in total (Dean 1997; Howe 2005; Van Vliet 2005). A further seven trials provided between 10 and 21 hours training (Barreca 2004; Blennerhassett 2004; Dean 2000; de Sèze 2001; Langhammer 2000; Salbach 2004; Winstein 2004). Two trials provided more than 40 hours training (Kwakkel 1999; Yen 2005), and two trials prescribed more than 40 hours home exercise therapy (Turton 1990; McClellan 2004).

Duration of training

The length of time that training was spread over varied from two to four weeks for seven trials (Blennerhassett 2004; Dean 2000; Dean 1997; de Sèze 2001; Howe 2005; Winstein 2004; Yen 2005). For two trials, the duration of training was over the inpatient rehabilitation period, with therapy for some participants in an outpatient setting if required (Langhammer 2000; Van Vliet 2005). The intervention in four trials was over six to eight weeks (Barreca 2004; McClellan 2004; Salbach 2004; Turton 1990). In one trial the intervention was over 20 weeks (Kwakkel 1999).

Intervention delivery

All of the interventions were delivered by trained physiotherapists or occupational therapists, except for the self-monitored home exercise programmes (McClellan 2004; Turton 1990), where trained staff input was restricted to prescription and programme review; in the trial by Howe 2005 where trained physiotherapy assistants provided balance training, and in the trial by Barreca 2004 where registered practical nurses delivered sit-to-stand training. Three of the interventions were delivered in a group setting of between four and seven participants per group (Barreca 2004; Blennerhassett 2004; Dean 2000). Of those programmes delivered in a circuit class format, authors report between 70% to 80% compliance (Blennerhassett 2004; Dean 2000; Salbach 2004). For the self-administered programmes in a home setting, authors reported a 68% to 75% self-monitored adherence to the prescribed exercise programme (McClellan 2004; Turton 1990).

Comparison interventions

Seven trials compared the intervention against an attention control: two trials used a recreation or cognitive therapy control group (Barreca 2004; Dean 1997), one used a splint control (Kwakkel 1999), and four used a comparison training programme for the upper or lower limb (Blennerhassett 2004; Dean 2000; McClellan 2004; Salbach 2004).

Seven trials compared the intervention against usual care. Of these, three were during inpatient rehabilitation and provided equivalent hours of therapy (de Sèze 2001; Langhammer 2000; Van Vliet 2005), and one provided additional hours of therapy (Winstein 2004). The other three intervention-control pairs were after discharge from inpatient rehabilitation, and additional to any outpatient treatment (McClellan 2004; Turton 1990; Yen 2005). It is unclear whether the duration of therapy for the intervention-control pair was equivalent for Yen 2005.

Outcomes

The 14 included trials used a wide range of different outcome measures, measurement statistics, and time intervals for follow up. Measures selected by the review team for each outcome category are detailed below, and in Additional Table 2 (Table 2) for ease of reference per outcome category. In some studies, more than one measure was available for a category, and in this case, we prioritised measures as detailed in the 'Methods of the review' section.

Primary outcomes

(1) Upper limb functional outcome measures

(a) Arm function: Action Research Arm Test (ARAT) (Kwakkel 1999), Wolf Motor Function Test (WMFT) (Yen 2005), Motor Assessment Scale (MAS) - arm (Blennerhassett 2004a; Langhammer 2000; Van Vliet 2005), Box and Block Test (BBT) (Salbach 2004b), Functional Test of the Hemiparetic Upper Extremity (FTHUE) (Winstein 2004), and Southern Motor Group Assessment - upper limb activity (Turton 1990)

(b) Hand function: Nine Hole Peg Test (9HPT) (Salbach 2004b), Ten Hole Peg Test (10HPT) (Turton 1990), Motor Assessment Scale (MAS) - hand (Blennerhassett 2004a; Langhammer 2000; Van Vliet 2005)

(c) Sitting balance and reach: Reaching distance (Dean 1997), Sitting Equilibrium Index (de Sèze 2001), Motor Assessment Scale (MAS) - balanced sitting (Langhammer 2000; Van Vliet 2005) and lateral reach - time to return to quiet sitting (Howe 2005)

(2) Lower limb functional outcome measures

(a) Walking distance: Six Minute Walk Test (6MWT) (Blennerhassett 2004b; Dean 2000; Salbach 2004a)

(b) Walking speed: Ten Metre Walk speed (10MWS) with walking aid (Dean 1997; Dean 2000; Kwakkel 1999a), Five Metre Walk comfortable speed (5MWS) (Salbach 2004a), and Six Metre walk speed (6MWS) (Van Vliet 2005)
(c) Functional Ambulation: Functional Ambulation Classification (FAC) (de Sèze 2001; Kwakkel 1999a), Motor Assessment Scale (MAS) - walking (Langhammer 2000; McClellan 2004; Van Vliet 2005)
(d) Sit to stand: Timed Up and Go (TUG) (Blennerhassett 2004b; Dean 2000; Salbach 2004a), Motor Assessment Scale (MAS) - sit to stand (Langhammer 2000; Van Vliet 2005), sit-to-stand time in seconds (Howe 2005), and number of people able to stand safely and independently on two occasions (Barreca 2004)
(e) Lower limb function: Sodring Motor Evaluation Scale (SMES) trunk, balance and gait subscale (Langhammer 2000), Step Test (Blennerhassett 2004b; Dean 2000), Rivermead leg and Trunk (Van Vliet 2005)
(f) Standing Balance and reach: Upright Equilibrium Index (de Sèze 2001), Functional Reach (McClellan 2004), and Berg Balance Scale (Salbach 2004a)

(3) Global motor function

Motor Assessment Scale (Langhammer 2000), and Rivermead Gross Function subscale (Van Vliet 2005)

Secondary outcomes

(1) ADL measures

The Barthel Index (BI) (Kwakkel 1999; Langhammer 2000; Salbach 2004a; Van Vliet 2005) and Functional Independence Measure (FIM) (de Sèze 2001). Two trials used the Barthel Index scoring out of 20 (de Sèze 2001; Van Vliet 2005), while the other trials used the scoring out of 100.

(2) Impairment measures

(a) Upper limb impairment: Sodring Motor Evaluation Scale arm subscale (Langhammer 2000) and the Fugl-Meyer Assessment (Winstein 2004)
(b) Lower limb or standing balance impairment: Trunk Control Test (de Sèze 2001), Sodring Motor Evaluation leg subscale (Langhammer 2000)

(3) Quality of life/health status measures

Dartmouth Primary Care Cooperative Chart (COOP) (Barreca 2004), and Nottingham Health Profile (NHP) (Kwakkel 1999: Langhammer 2000)

(4) Adverse events

Number of falls was the only adverse event measured (Barreca 2004). Three trials narratively reported adverse events (de Sèze 2001; McClellan 2004; Salbach 2004a).

Excluded studies

There is a large number of excluded studies described in Characteristics of excluded studies. Because of the difficulties in determining whether trial interventions included task-specific functional repetition, we have attempted to be as transparent as possible about the basis on which trials were excluded. The reasons for exclusion were:
(1) not repetition, or unable to determine amount of practice: thee studies;
(2) not functional, or no functional outcome: seven studies;
(3) interpreted as focussing on exercise: four studies;
(4) mixed interventions: seven studies;
(5) comparison group also includes repetitive task practice: three studies;
(6) passive movement: one study;
(7) trial not completed or information not available: three studies;
(8) methodological reasons: five studies.
The excluded studies included three trials that were translated from Chinese to English (Li 2005; Liao 2006; Xiao 2002). While full paper translation was undertaken by native speaking health service workers, there is the possibility that information was mis-interpreted or misunderstood.

Ongoing studies

There are seven ongoing studies, where the information available is sufficient to say that the interventions include an element of RTT. Three trials (Allison 2005; Askim 2005; Harris 2006), involve training for standing, balance or sit to stand. Two trials (English 2005; Sherrington 2005) are of lower limb circuit training, and one trial (Miller 2002) is of upper limb task-specific training. One trial (Langhammer 2005) uses a motor relearning approach. All are with participants in the early stages of stroke recovery, except Langhammer 2005.

Studies awaiting assessment

Of the 17 studies awaiting assessment, 11 are ongoing studies, where the information available is insufficient to be able to determine whether they would be eligible for inclusion in the review. One study (McClain 2004) is unpublished, and we are awaiting data. For one published study (Wang 2005), we were unable to contact the authors to determine the exact content of the intervention. Three studies (Muller 2004; Vaidya 2003; Venova 2003) were published as conference proceedings, and we were unable to contact the authors. One study (Yang 2006) was identified late in

the review process, and we are attempting to contact the authors to determine eligibility.

Risk of bias in included studies

Allocation

Allocation concealment was adequate in eight trials (Blennerhassett 2004; Dean 2000; Howe 2005; Kwakkel 1999; McClellan 2004; Salbach 2004; Van Vliet 2005; Winstein 2004). In five trials, allocation concealment was unclear. Three trials (de Sèze 2001; Langhammer 2000; Yen 2005) stated random allocation was used, but provided no description of the procedure. The trial by Dean 1997 attempted concealment with a procedure involving participants drawing cards out of a box containing 10 control group and 10 experimental group cards, however the procedure for ensuring that those recruiting participants remained unaware of assignments is not described. One trial (Barreca 2004) used coin flipping to randomise participants with no further description of the procedure. In one quasi-experimental trial (Turton 1990), participants were allocated to intervention or control groups in alternate runs of five, so allocation was not concealed.

Blinding

Blinding of primary outcome assessment was stated in all trials except two (Turton 1990; Winstein 2004). Of the studies that stated observer blinding, three (Langhammer 2000; McClellan 2004; Yen 2005) gave no further details of how this was done. Four trials (Dean 2000; Kwakkel 1999; Salbach 2004; Van Vliet 2005) checked whether the outcome assessor had become unblinded, and out of these, three trials (Dean 2000, Salbach 2004; Kwakkel 1999) reported that some degree of unmasking may have occurred.

Follow up and exclusions

Twelve trials provided information about numbers of withdrawals and reasons for withdrawal (Barreca 2004; Blennerhassett 2004; Dean 1997; Dean 2000; Howe 2005; Kwakkel 1999; Langhammer 2000; McClellan 2004; Salbach 2004; Turton 1990; Van Vliet 2005; Winstein 2004); there were no withdrawals in two trials (de Sèze 2001; Yen 2005).

All trials, with the exception of one (Winstein 2004), accounted for all participants at the end of the trial. The trial by Winstein 2004 included participants in the analysis only if they completed the treatment programme.

Nine trials had less than 10% loss to follow up post treatment (Barreca 2004; Blennerhassett 2004; Dean 1997; de Sèze 2001; Howe 2005; Salbach 2004; Turton 1990; Winstein 2004; Yen 2005). Three trials had between 10% and 20% loss to follow up post treatment (Kwakkel 1999; Langhammer 2000; McClellan 2004). Two trials had more than 20% loss to follow up post treatment (Dean 2000; Van Vliet 2005).

Other potential sources of bias

To detect systematic differences in care provided to participants in comparison groups other than the intervention under investigation, trials were assessed to determine whether groups were treated equally during the intervention and during usual care. During the intervention, groups were treated equally in 10 trials (Barreca 2004; Blennerhassett 2004; de Sèze 2001; Dean 1997; Dean 2000; Kwakkel 1999; Langhammer 2000; McClellan 2004; Salbach 2004; Turton 1990). In one trial there was no significant difference in the amount of treatment, however there may have been differences in elements of treatment such as detailed feedback and social conversation (Van Vliet 2001). In one trial it is not clear whether groups were treated equally (Yen 2005).

In two trials participants in the intervention group received additional hours of therapy (Howe 2005; Winstein 2004). In Winstein 2004 participants in the functional task practice group received an additional 20 hours of therapy over a four-week period; participants in the balance training arm of the trial by Howe 2005 received an additional 12 therapy sessions over four weeks.

During usual care groups were treated equally in eight trials (Barreca 2004; Blennerhassett 2004; Dean 1997; Dean 2000; Howe 2005; Kwakkel 1999; Langhammer 2000; Turton 1990). In four trials no information is provided (de Sèze 2001; Van Vliet 2005; Winstein 2004; Yen 2005) and in a further two trials (McClellan 2004; Salbach 2004) there is no usual care group.

Effects of interventions

Primary outcomes

Results are presented for (1) upper limb and (2) lower limb outcomes, and (3) global motor function. All results are post therapy, except for Langhammer 2000, which is three months post stroke, and Van Vliet 2005, which is three months post baseline.

Upper limb function: post treatment

Results are presented for (1) arm function, (2) hand function, and (3) sitting balance and reach.

Comparison 01.01: Arm function

Eight trials (Blennerhassett 2004a; Kwakkel 1999b; Langhammer 2000; Salbach 2004b; Turton 1990; Van Vliet 2005; Winstein 2004; Yen 2005) recruiting 467 participants measured arm function. Data were available for 88% (N = 412) of participants. The

impact of functional training on upper limb function post therapy overall indicated a small but marginally non-significant effect: SMD 0.17, 95% CI -0.03 to 0.36.

Comparison 01.02: Hand function

Five trials (Blennerhassett 2004a; Langhammer 2000; Salbach 2004b; Turton 1990; Van Vliet 2005) recruiting 324 participants measured hand function. Data were available for 87% (N = 281) of participants. The impact of functional training on hand function was small and non-significant: SMD 0.16, 95% CI -0.07 to 0.40.

Comparison 01.03: Sitting balance/reach

Five trials (de Sèze 2001; Dean 1997; Howe 2005; Langhammer 2000; Van Vliet 2005), recruiting 256 participants measured sitting balance or functional reach. Data were available for 82% (N = 210) of participants. There was some heterogeneity of treatment effects (I^2 = 32%), although not sufficient to merit the use of a random-effects approach. The impact of functional training on sitting balance and reach was small and not statistically significant: SMD 0.23, 95% CI -0.05 to 0.50.

Upper limb function: follow up

Comparison 02.01: All outcomes

(1) Under six months post treatment

Two trials (de Sèze 2001; Howe 2005) recruiting 55 participants measured some aspect of upper limb function for retention effects of RTT interventions under six months post treatment. Data were available for 93% (N = 51) of participants. There was a moderate effect size which was not statistically significant: SMD 0.50, 95% CI -0.06 to 1.06.

(2) Between six and 12 months post treatment

Four trials (Blennerhassett 2004a; Langhammer 2000; Van Vliet 2005; Winstein 2004) recruiting 254 participants measured arm function for retention effects of RTT interventions between six and 12 months post treatment. Data were available for 76% (N = 195) of participants. Results showed no effect of treatment: SMD -0.02, 95% CI -0.31 to 0.26.

Upper limb function: subgroup analyses

Comparison 03.01: Dosage of task practice

Trials were classified according to whether they provided 0 to 20 hours of therapy (eight trials), or more than 20 hours of therapy (three trials). The greater duration of training for upper limb function showed a somewhat larger and borderline statistically significant effect size: SMD 0.40, 95% CI 0.03 to 0.78, versus the lower dosage of task practice: SMD 0.18, 95% CI -0.02 to 0.39, although these effects were not significantly different (chi squared = 1.03, df = 1, P = 0.31).

Comparison 03.02: Time since stroke

Trials were classified according to whether they recruited within 15 days post stroke (four trials), 16 days to 6 months post stroke (four trials), or more than six months post stroke (three trials). The difference between the groups did not reach statistical significance (chi squared = 0.05, df = 2, P = 0.98).

Comparison 03.03: Type of intervention

Trials were classified according to whether they were whole therapy approaches (two trials), mixed task training (six trials), or single task training (three trials). There is little evidence that the type of RTT training has an impact on effect, with both whole therapy and mixed functional task training approaches showing a small but non-significant effect: whole therapy SMD 0.16, 95% CI -0.18 to 0.49, mixed training SMD 0.20, 95% CI -0.04 to 0.44. While there was more evidence of effect of single task training: SMD 0.51, 95% CI 0.03 to 0.99, this was based on a small number of participants, all single-task training trials were interventions related to balance training, and the difference between the subgroups was non-significant (chi squared = 1.58, df = 2, P = 0.45).

Lower limb function: post treatment

Results are presented for (1) walking distance, (2) walking speed, (3) functional ambulation, (4) sit-to-stand, (5) lower limb function and (6) standing balance/reach. All results are post therapy, except for Langhammer 2000, which is three months post stroke, and Van Vliet 2005, which is three months post baseline.

Comparison 04.01: Walking distance: change from baseline

Three trials (Blennerhassett 2004b; Dean 2000; Salbach 2004a) recruiting 133 participants measured walking distance. Data were available for 98% (N = 130) of participants. Change from baseline scores are presented. Using a random-effects model because of significant heterogeneity in treatment effects, results were statistically significant: MD 54.6, 95% CI 17.5 to 91.7. Re-analysis using the

standardised mean difference confirmed that the result remained statistically significant: SMD 0.98, 95% CI 0.23 to 1.73. In effect, participants in the experimental groups could walk on average 55 metres further in six minutes than those in the control groups.

Comparison 04.02: Walking speed

Five trials (Dean 1997; Dean 2000; Kwakkel 1999a; Salbach 2004a; Van Vliet 2005) recruiting 311 participants measured walking speed, with data available for 85% (N = 263) of participants. Results showed a small, statistically significant effect size: SMD 0.29, 95% CI 0.04 to 0.53.

Comparison 04.03: Functional ambulation

Five trials (de Sèze 2001; Kwakkel 1999a; Langhammer 2000; McClellan 2004; Van Vliet 2005) recruiting 295 participants measured functional ambulation, with data available for 81% (N = 238). There was some heterogeneity of treatment effects, but not sufficient to warrant using a random-effects method of analysis. Results indicated a small, borderline statistically significant effect: SMD 0.25, 95% CI 0.00 to 0.51.

Comparison 04.04: Sit-to-stand: post treatment/change from baseline

Seven trials (Barreca 2004; Blennerhassett 2004b; Dean 2000; Howe 2005; Langhammer 2000; Salbach 2004a; Van Vliet 2005) recruiting a total of 397 participants, included a measure of sit-to-stand, with data available for 87% (N = 346). Results were significant overall: standardised effect size 0.35, 95% CI 0.13 to 0.56.

Comparison 04.05: Lower limb functional measures

Four trials (Blennerhassett 2004b; Dean 2000; Langhammer 2000; Van Vliet 2005) recruiting 223 participants included a measure of lower limb function, with data available for 79% (N = 176). Results overall showed a small effect size, which was not statistically significant: SMD 0.20, 95% CI -0.10 to 0.50.

Comparison 04.06: Standing balance/reach

Three trials (de Sèze 2001; McClellan 2004; Salbach 2004a) recruiting 137 participants measured standing balance or functional reach, with data available for 96% (N = 132). Results showed a small effect size, which was not statistically significant: SMD 0.29, 95% CI -0.06 to 0.63.

Lower limb function: follow up

Comparison 05.01: all outcomes

(1) Under six months post treatment

Four trials (de Sèze 2001; Dean 2000; Howe 2005; McClellan 2004) recruiting 93 participants measured some aspect of lower limb function for retention effects of RTT interventions under six months post treatment. Data were available for 86% (N = 80) of participants. Effects across trials were homogeneous (I^2 = 0%). Results showed a very small effect size which was not statistically significant: SMD 0.11, 95% CI -0.33 to 0.56.

(2) Between six to 12 months post treatment

Three trials (Blennerhassett 2004b; Langhammer 2000; Van Vliet 2005) recruiting 211 participants measured some aspect of lower limb function for retention effects of RTT interventions between six to 12 months post treatment. Data were available for 80% (N = 170) of participants. There was some degree of heterogeneity of treatment effects (I^2 = 49.1%), although not sufficient to merit the use of a random-effects approach (and the small effect size precludes the need to perform a sensitivity analysis on the choice of analytic approach). Results showed no treatment effect: SMD -0.01, 95% CI -0.32 to 0.29.

Lower limb function: subgroup analyses

Comparison 06.01: Dosage of task practice

Two trials providing more than 20 hours of task practice showed a moderate effect size: SMD 0.56, 95% CI 0.11 to 1.01, There was a small, borderline non-significant effect from eight trials providing 20 hours training or less: SMD 0.19, 95% CI -0.03 to 0.40. However, the difference in effects between these subgroups was not statistically significant (chi squared = 2.11, df = 1, P = 0.15).

Comparison 06.02: Time since stroke

The analysis suggests that size of the effect on lower limb function is the same whether recruitment to training is within 15 days post stroke (three trials): SMD 0.24, 95% CI -0.04 to 0.52, from 15 days to six months of stroke (four trials): SMD 0.29, 95% CI -0.11 to 0.69, or more than six months post stroke (three trials): SMD 0.26, 95% CI -0.11 to 0.62 (chi squared = 0.04, df = 2, P = 0.98).

Comparison 06.03: Type of intervention

Results for single task (three trials): SMD -0.07, 95% CI -0.55 to 0.41, and whole therapy approaches (two trials): SMD 0.10, 95% CI -0.24 to 0.43 are not statistically significant, although the total sample size for single task training is very small (N = 63). Mixed training (five trials) had a moderate and statistically significant effect: SMD 0.48, 95% CI 0.20 to 0.75. There was a statistically significant difference between subgroups (chi squared = 5.06, df = 2, P = 0.08), suggesting that mixed training might be better than other forms of training for lower limb function.

Global motor function

Comparison 07.01: Global motor function scales

Two trials (Langhammer 2000; Van Vliet 2005), recruiting a total of 181 participants measured global motor function. Results were available for 76% (N = 138) of participants and indicated a small to moderate effect size, although this was of borderline statistical significance: SMD 0.32, 95% CI -0.01 to 0.66. There were too few trials to undertake planned subgroup analyses for global functional outcomes.

Secondary outcomes

Results are presented for (1) ADL function, (2) upper limb impairment, (3) lower limb impairment, (4) quality of life/health status, and (5) adverse events.

Comparison 08.01: ADL function

Seven intervention-control pairs (de Sèze 2001; Kwakkel 1999a; Kwakkel 1999b; Langhammer 2000; Salbach 2004a; Salbach 2004b; Van Vliet 2005), recruiting a total of 399 participants, used a measure of activities of daily living with data available for 81% (N = 325). Kwakkel 1999 comprises the combined results for the upper and lower limb training groups compared against a splint control group, based on the assumption that effect sizes are similar for the two intervention-control pairs. The data presented for Salbach 2004 are the results for the lower limb training group compared against the upper limb training attention control group (Salbach 2004a). Overall results indicated a small effect size that was statistically significant: SMD 0.29, 95% CI 0.07 to 0.51.

Comparison 08.02: Upper limb impairment

Three trials (Langhammer 2000; Salbach 2004b; Winstein 2004), recruiting 195 participants, measured upper limb impairment, with data available for 94% (N = 184). The small effect size shown was not statistically significant: SMD 0.14, 95% CI -0.15 to 0.43.

Comparison 08.03: Lower limb impairment

Two trials (de Sèze 2001; Langhammer 2000), recruiting 81 participants, included a measure of lower limb impairment, with data available for 90% (N = 73). The small effect size shown was not statistically significant SMD 0.13, 95% CI -0.33 to 0.59.

Comparison 08.04: Quality of life/health status

Three intervention-control pairs (Barreca 2004; Kwakkel 1999; Langhammer 2000), recruiting 177 participants, used a measure of quality of life or health status, with data available for 83% (N = 148). All results are post therapy except Kwakkel 1999, which was measured at 26 weeks. There was a very small effect size, which was not statistically significant: SMD 0.08, 95% CI -0.24 to 0.41.

Adverse events

One trial of sit-to-stand training (Barreca 2004) presented data for the number of falls: intervention group 3/25 (12%) versus control group 4/23 (17.4%), OR 0.65, 95% CI 0.13 to 3.27. No other trials presented data for adverse events, but two trials narratively reported no adverse effects (de Sèze 2001; McClellan 2004). In Salbach 2004, intervention-related reasons for withdrawal that could be interpreted as adverse events included one participant out of 47 in a mobility training group who experienced the onset of groin pain. Four participants also fell during the mobility intervention but did not suffer injury and continued to participate in the group. Two falls also occurred during evaluation. No other trials reported intervention-related reasons for withdrawal.

Sensitivity analyses

Planned sensitivity analyses were conducted for (1) allocation concealment, (2) type of comparison group, and (3) equivalence of therapy time.

Comparison 09.01: Allocation concealment

Trials were grouped according to whether allocation concealment was judged to be adequate (eight trials): SMD 0.37, 95% CI 0.17 to 0.58, or inadequate/unclear (five trials): SMD 0.40, 95% CI 0.07 to 0.74. There was no statistically significant difference between the subgroups (chi squared = 0.03, df = 1, P = 0.86).

Comparison 09.02: Comparison groups

While six trials with an attention control comparison group showed a somewhat larger effect size (SMD 0.53, 95% CI 0.26 to 0.80) than seven trials using usual care comparisons (SMD 0.27, 95% CI 0.03 to 0.50) the difference was not quite statistically significant (chi squared = 2.08, df = 1, P = 0.15).

Comparison 09.03: Equivalence of therapy time

Two trials gave additional therapy time to the experimental group (SMD 0.09, 95% CI -0.41 to 0.59) versus trials where therapy time for experimental and control groups was equivalent (SMD 0.42, 95% CI 0.23 to 0.61). There was no significant difference between the two subgroups (chi squared = 1.47, df = 1, P = 0.23).

DISCUSSION

Summary of main results

Upper limb function/sitting balance

Eight trials (Blennerhassett 2004; Kwakkel 1999b; Langhammer 2000; Salbach 2004b; Turton 1990; Van Vliet 2005; Winstein 2004; Yen 2005) with 467 participants measured upper limb function. Of these, two trials (Langhammer 2000; Van Vliet 2005) were whole therapy approaches, two trials (Blennerhassett 2004; Salbach 2004b) were circuit training approaches, three trials (Kwakkel 1999b; Turton 1990; Winstein 2004), were functional task practice combined with other forms of upper limb exercise, and one trial (Yen 2005) was the intensive practice component of constraint-induced movement therapy without the constraint. All of these interventions were delivered by a therapist, except Turton 1990, which consisted of self-initiated practice in the home environment using a booklet of exercises after instruction by a therapist. Of the arm training trials, all but two (Salbach 2004b; Yen 2005) were carried out 0 to six months post stroke. Five trials (Blennerhassett 2004; Langhammer 2000; Salbach 2004b; Van Vliet 2005; Winstein 2004) had a total training time of 20 hours or less, and three trials (Kwakkel 1999b; Turton 1990; Yen 2005) provided more than 20 hours total training time. In two of the trials (Turton 1990; Winstein 2004) training time was additional. Five trials (de Sèze 2001; Dean 1997; Howe 2005; Langhammer 2000; Van Vliet 2005) with 256 participants measured sitting balance/reach from sitting. Of these, two trials (Langhammer 2000; Van Vliet 2005) were whole therapy approaches, while the other three trials specifically trained sitting balance or reach from sitting. All of the interventions were carried out in the 0- to six month post-stroke period and delivered by a therapist in a hospital setting, except one trial (Dean 1997). Here the intervention was carried out at home, with people more than six months post stroke. All of the interventions were 20 hours training or less.

In summary, there was no evidence for the effectiveness of RTT on arm function (SMD 0.17, 95% CI -0.03 to 0.36), hand function (SMD 0.16, 95% CI -0.07 to 0.40), or sitting balance/functional reach (SMD 0.23, 95% CI -0.05 to 0.50). Results for later follow up were also not statistically significant up to six months post therapy (SMD 0.50, 95% CI -0.06 to 1.06), or between six months and one year post therapy (SMD -0.02, 95% CI -0.31 to 0.26). Treatment effects were not modified by dosage of task practice, time since stroke or type of task training.

Lower limb function/standing balance

Nine trials (Barreca 2004; Blennerhassett 2004b; Dean 2000; de Sèze 2001; Kwakkel 1999a; Langhammer 2000; McClellan 2004; Salbach 2004a; Van Vliet 2005), with 476 participants measured lower limb function or standing balance, or both. Of these, one trial (Barreca 2004) specifically trained sit-to-stand movements, one trial (de Sèze 2001) trained sitting and standing balance, two trials (Langhammer 2000; Van Vliet 2005) were whole therapy approaches, three trials (Blennerhassett 2004b; Dean 2000; Salbach 2004a) were circuit training approaches, and two trials (Kwakkel 1999a; McClellan 2004) were lower limb task practice combined with other forms of mobility exercise. All trials were delivered by a therapist in a hospital or community setting, except for one trial (McClellan 2004), which was a home mobility programme for participants following a videotaped exercise programme with therapist telephone contact and follow up. Three of the interventions were carried out more than six months post stroke (Dean 2000; McClellan 2004; Salbach 2004a). Two trials included more than 20 hours total practice time (Kwakkel 1999a; McClellan 2004).

In summary, there was evidence for a statistically significant small to moderate impact of RTT training on some aspects of lower limb function, including walking distance (MD 54.6, 95% CI 17.5 to 91.7), walking speed (SMD 0.29, 95% CI 0.04 to 0.53), and sit-to-stand (standard effect estimate 0.35, 95% CI 0.13 to 0.56). Results for functional ambulation were small, and of borderline statistical significance: SMD 0.25, 95% CI 0.00 to 0.51. There was no evidence of effect on lower limb functional measures, or standing balance/reach. Results at follow up were not statistically significant at up to six months post therapy (SMD 0.11, 95% CI -0.33 to 0.56), or up to one year post therapy (SMD -0.01, 95% CI -0.32 to 0.29). Effects were not found to be dependent on time since stroke. Effects of larger versus smaller amounts of training also did not reach statistical significance (P = 0.15). Comparing mixed task training approaches against whole therapy or single task training showed a moderate effect (P = 0.08). However, the sample size (N = 63) for single task training was very small.

Global motor function

For the two trials (Langhammer 2000; Van Vliet 2005) using global motor function measures, there was a pooled small to moderate, borderline statistically significant effect on global motor function: SMD 0.32, 95% CI -0.01 to 0.66.

Secondary outcomes

There was a small, statistically significant effect on activities of daily living: SMD 0.29, 95% CI 0.07 to 0.51. There was no evidence of impact on upper limb impairment (SMD 0.14, 95% CI -0.15 to 0.43), lower limb impairment (SMD 0.13, 95% CI -0.33 to 0.59), or perceptions of quality of life/health status (SMD 0.08, 95% CI -0.24 to 0.41). Repetitive task training was not associated with a greater number of adverse events, although the data on which this was based were limited.

Overall completeness and applicability of evidence

The included trials were clinically diverse in focus and there are gaps in the evidence base, particularly for people who are more than six months post stroke. Only two trials have evaluated the impact of RTT on upper limb function in people more than six months post-stroke: one trial for 20 hours or less (Salbach 2004b), and one for more than 20 hours (Yen 2005). Only two trials have evaluated the impact of RTT on upper limb function in people zero to six months post stroke (Kwakkel 1999b; Turton 1990). More trials have focused on the impact of RTT on lower limb function, but here there are also gaps in the evidence, with only one trial evaluating more than 20 hours lower limb training in people zero to six months post stroke (Kwakkel 1999a), and one trial providing more than 20 hours training for people more than six months post stroke (McClellan 2004).

Although we were unable to classify participants into more disabled or less disabled participant subgroups, the Characteristics of included studies table illustrates the wide range of disability levels of the participants within the included trials. However, many of the trials had inclusion criteria specifying either minimum, or minimum and maximum levels of ability, motivation to participate, and ability to understand instruction. The evidence provided by the review therefore appears to be widely applicable, perhaps with the exception of very severely disabled people with little postural control or voluntary movement, those with very mild deficits, and those with severe communication difficulties.

Trials were excluded when the repetition described appeared to be primarily for strength or endurance training, for example cycling or gait training, and when the type of training appeared divorced from the functional aim, for example backward walking training, slot machines, or computer games. This may have consequences for the applicability of the evidence. By the exclusion of trials of what could be defined as 'pre-functional' types of movement, we will effectively have excluded a group of people who cannot yet participate in functional movement. The same consequence applies to the exclusion of trials with a large element of passive and active-assisted movement.

In terms of generalisability to the UK, only three interventions have been evaluated in this setting. One trial is a whole therapy approach (Van Vliet 2005), one trial evaluated balance training (Howe 2005), and one quasi-experimental trial evaluated self-delivered exercise in the home environment (Turton 1990). Repetitive task training has not traditionally been a significant part of therapy after stroke in the UK, which has been dominated by the Bobath approach. This specifically minimises repetitive active movement, and relies upon therapist-guided restoration of 'normal movement' patterns, rather than the functional but unnatural ones which could occur as a result of a more pragmatic approach within RTT. Many of the studies in the review were from outside the UK, or used therapy approaches which have been less popular, such as motor learning. Whilst clinical experience suggests that modern stroke units have a more eclectic therapy approach it may take longer for the results to change practice within the UK than countries that already use RTT routinely. Although RTT is likely to be transferable in principle, its effectiveness against other forms of care usual in the UK and its acceptability in this healthcare setting has not been tested, except as part of the overall movement science approach in the trial by Van Vliet 2005. In particular, the feasibility and acceptability of circuit-style training approaches in community settings would need to be evaluated. The delivery of interventions after the normal rehabilitation period also represents additional periods of treatment than those currently provided.

The acceptability and safety of RTT to all types of participants is also unclear. While there were few adverse effects reported overall, the lack of formal reporting means that this finding is inconclusive. Of the information provided about reasons for drop outs in the trials, the most frequent cause was physical illness, and only a very small proportion of those participating dropped out for physical reasons that might have been related to the intervention. Excluding illness, 11 participants failed to complete treatment in the experimental groups, and seven participants in the control groups, which was not a significant difference. However, there were also a small number of participants who were lost to follow up for reasons related to compliance or treatment preference.

Information about recruitment was not often provided, but of those that did provide information, a large trial recruiting inpatients early after stroke had a relatively low number of refusals to participate (for example, Kwakkel 1999 had four out of 101 participants who did not give consent), while a trial recruiting in the community after rehabilitation had high numbers of refusal of the intervention (for example, Salbach 2004a had 73% refusal). It may be that some forms of intervention are less acceptable, or that interventions only appeal to a subset of stroke survivors, particularly if travel is involved.

We were unable to reach any conclusions about the impact of numbers of repetitions as a measure of the intensity of practice, as this information was rarely provided. The amount of task practice is therefore a measure of the intervention duration (that is, time spent).

We were also unable to comment on the resource implications of different sites of treatment, therapist-delivered versus self-delivered interventions, or group versus individual delivery, as there were too few trials for comparison. However, the presence of two

trials involving self-delivery in the home environment (McClellan 2004; Turton 1990), and three trials involving group delivery of task-specific training (Barreca 2004; Blennerhassett 2004; Dean 2000), suggest that these modes of delivery are feasible. The two studies that collected information showed generally high levels of satisfaction with the programme (Barreca 2004; Dean 2000). Attendance levels at community programmes were also very good, suggesting that these training programmes were well received by those who chose to participate.

Quality of evidence

Eight out of 14 trials had adequate allocation concealment. Five out of the remaining six trials reported allocation concealment, but the method was often unclear. However, when trials with an unclear method of allocation concealment were grouped with trials where it was judged inadequate or not used (one trial), there was no statistically significant difference in treatment effect compared against trials with adequate allocation concealment. Of the randomised controlled trials that were not pilot studies, only four out of 10 gave a power calculation for sample size. These were some of the larger studies (Blennerhassett 2004; Langhammer 2000; Salbach 2004; Van Vliet 2005). However, half of the 14 trials had more than 50 participants. Most of the trials stated that blinded independent assessors were used, but only a minority referred to checks for assessor unblinding. Therapy time was non-equivalent in two trials. The overall quality of trials gives a degree of confidence in the results.

Potential biases in the review process

When the review was being designed, an early decision was made to consider the effect of RTT on upper and lower limb function outcomes separately, as we thought that there might be a differential impact. The results of the review support this decision, although there are two disadvantages. Firstly, we are unable to give an overall effect estimate for RTT, although considering the different interventions and objectives of upper and lower limb training this may not have been a clinically meaningful figure. Secondly, subgroup analyses are smaller, and therefore less well powered than they would have been if all 14 trials had been combined. As the number of studies reported in the subgroup analyses are small, the results should be treated with caution.

Our major focus in this review was impact on task-specific function. In practice, we excluded a large number of studies, on the basis that we did not judge the outcomes to be functional, or the intervention to be task-specific. We have also included studies where our interpretation of the intervention was that repetition of functional movement was a major mechanism of action (for example, de Sèze 2001). Whether balance training is truly 'functional' is also a matter of interpretation.

Although interventions were often well described, it was sometimes difficult to estimate the relative intensity of treatment, especially within mixed interventions. Information on the number of repetitions was rarely available. This potentially means that the review is investigating the impact of functional task specificity rather more than the element of repetition. In addition, many of the trials referred to motor learning principles as the basis for the intervention. This approach involves a much more complex set of principles than just task-specific repetition, including targeting to individual needs, task variation and particular forms of feedback. Inclusion of these trials in the review suggests reducing motor learning or movement science therapies to their lowest common denominator, but even those trials which did not claim a basis in such approaches often also included aspects of active learning, task shaping, feedback, or individualisation of treatment. Our decision was to include trials if we could clearly identify the amount of practice.

The included trials used a wide range of outcome measures, methodologies and time intervals for follow up making summary statistics difficult. We made strenuous efforts to obtain data suitable for pooling for each outcome, but sometimes these were not available, and the method of pooling less than optimum, such as the use of standardised mean difference for walking speed. It would have been better to use outcome changes compared to baseline, especially for analyses with smaller numbers of participants, but these were also not available across trials. We also generally used fixed-effect analyses, which some might criticise due to the presence of some clinical heterogeneity in the treatments and trials combined.

The subgroup analysis of trial design (that is, attention control versus usual care control) did not reach statistical significance, but was approaching it ($P = 0.15$). However, maintaining the upper and lower limb trials separately meant that further subdivision into type of comparison group was not feasible.

Agreements and disagreements with other studies or reviews

As in other reviews (for example, Kwakkel 2004), this review suggests there is a differentiation of effect of training for upper and lower limbs. Repetitive task training resulted in modest improvements in lower limb function, but in contrast to other reviews (such as Barreca 2003) we found no evidence of significant benefit from repetitive training of upper limb function. While treatment effects of longer versus shorter amounts of training were of a different magnitude for upper limb function, the difference did not reach statistical significance. Hence, the review did not provide evidence to support a suggestion that upper limb results are moderated by the amount of practice (Van der Lee 2001). However, this is very tentative, as only three studies included more than 20 hours training.

There were small positive effects on global motor function, activities of daily living, and ambulation classification. Even though the amount of change is small, the clinical benefit of the change in activities of daily living is likely to be meaningful in relation to quality of life (Van Exel 2004).

In those studies that did show a benefit and provided later assessments, improvements at the end of training were not evident at the later stage. It is unclear from this review whether this is related to characteristics of the participants, the intensity of training or the degree of improvement required before detectable change was noted.

Evidence from this review does not support the suggestion that earlier provision of treatment results in greater functional improvement as treatment effects were not modified by time since stroke. Improvement in function was possible even in the later stages of recovery (Page 2004). We were unable to come to any conclusions about the previously identified dose-response relationship between amount of therapy and improved outcome (Kwakkel 2004), but the results from subgroup analysis suggest this as a priority for further research.

In a review of physiotherapy treatments after stroke (Pollock 2007) it is suggested that research should be conducted to determine the efficacy of clearly described individual techniques and task-specific treatments. Clear definition of individual techniques still remains a challenge but this review suggests that focussing on specific treatments is possible although a taxonomy for grouping such interventions does not exist. Readers may not agree with some of our classification of studies, but the review group compared all interventions in detail to make these difficult decisions.

The mechanisms of action responsible for any lower limb functional gain are still unclear. Many of the interventions were mixed, and while all contained repetition and functional practice, they could also include elements of endurance or strength training. However, the review of treadmill training (Moseley 2005) found very little evidence of impact. Results of a recent review of robot-aided therapy on arm function (Prange 2006) also showed no consistent functional gain. Given that repetition is a major mechanism of action in both treadmill and robotics, this would suggest that reflecting real-world task complexity in training is a significant factor. However, other potential mechanisms of action are also implicit in some of the trial interventions, such as self-efficacy, task-novelty, and motivation to participate in the interventions delivered in a group setting.

In this review, we did not compare RTT against other interventions. Research comparing 20 hours functional task practice with strength training (Winstein 2004) in 64 participants with recent stroke suggested that the immediate benefits of a functional task approach were similar to those of a resistance strength training approach, but that the functional task approach was more beneficial in the longer term. However, this review did not find evidence of retention effects for RTT at six or 12 months.

AUTHORS' CONCLUSIONS

Implications for practice

The results of this review provide sufficient evidence to validate the general principle that repetitive, task-specific training for lower limbs can result in functional gain when compared against other forms of usual care or attention control. While functional gain is modest, impact does appear to be of a clinically meaningful magnitude. It is, however, unclear as to whether effects are sustained. There is insufficient evidence to make any recommendations for upper limb interventions, but repetitive task training showed no significant advantage. Some caution is needed in interpreting the lack of evidence for adverse effect, as few trials specifically monitored these as an outcome. If task-specific training is used in clinical practice, adverse effects should be monitored.

Implications for research

Further primary research should be directed towards exploration of the impact of the type and amount of task training for lower limb function, and how to maintain functional gain. It is unclear whether task training accelerates recovery or simply improves performance for an interval. This review did not provide evidence of a treatment effect for upper limb function. However, only three trials provided evidence to estimate the effect of more intensive therapy, two of which were in the acute stage of stroke, and one in the sub-acute stage. The trials also included people of differing levels of ability at entry. The conclusion of this review about lack of evidence for efficacy of task training for arm function is therefore very tentative, and further research relating to the type, amount and intensity of task training for arm function among participants with different clinical characteristics would be useful.

There were insufficient trials included in the review to evaluate the efficacy and cost-effectiveness of different intervention delivery methods for repetitive task training, such as group training, or practice in the home environment. Further research should address practical ways of delivering repetitive task training interventions. In particular, the acceptability of circuit type training interventions in community settings would need to be evaluated. Further research should also address practical ways of maintaining post-therapy functional gain. Future trials should be powered to detect cost-effectiveness as well as clinical effect, and should include a quality of life measure as one of the outcomes.

We were unable to investigate the impact on people of different levels of pre-intervention disability, because of the wide range of baseline measures used. Analyses of this type would be facilitated by the inclusion in trials of baseline data using a common measure such as the Barthel Index, which can be related to population norms dependent on time since stroke.

This review did not compare repetitive functional task training against other interventions not currently viewed as a component

of usual care. A review of this type would be valuable.

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* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Barreca 2004

Methods	Single centre randomised controlled trial Eligible patients admitted consecutively were assigned by coin flip to the conventional practice group during the first 4 months of the study; during the second 4 months, eligible patients were assigned by coin flip to the extra practice group This sequence of block randomisation was conducted 3 times in total
Participants	Canada 48 participants: 25 intervention, 23 control Participants recruited from admission to a rehabilitation centre within 1 month of stroke Inclusion criteria: between the ages of 18 to 90 years, medically stable, postural control Stage 3 or greater on the Chedoke McMaster Stroke Assessment (lying to sitting in bed using strong side), but not Stage IV (lying to sitting on side of bed, using strong side) Exclusion criteria: none stated Mean age 68 years, range 56 to 78 years 65% male Stroke details: not stated whether first or recurrent stroke, 73% ischaemic, 42% right hemiparesis Timing post stroke: 30 days, range 18 to 50 days Pre-intervention functional ability level: lack of postural control
Interventions	Sit-to-stand training: group class practice in attaining standing from sitting from a variety of different heights and surfaces Training was additional to usual care, which included daily strengthening exercise, repetitive training, functional training, electrical stimulation and other exercise Sessions were 45 minutes, 3 times a week until competence or discharge (approx 6 weeks) = 13.5 hours + practice on ward Each session aimed to involve 3 practice sets of 5 sit-to-stand manoeuvres per class Average total repetitions during training = 450 to 500 Classes had 6 to 7 participants, supervised by 2 registered practical nurses, with extra practice delivered by nurses trained on the sit to stand protocol in a ward setting using videotapes, written instruction and practice Comparison group: usual care + recreation therapy
Outcomes	Outcomes recorded at competence or discharge (approx 6 weeks) Limb-specific functional outcome measures: number of people able to stand independently and safely on 2 consecutive occasions Other: number of falls, health status satisfaction (with ability to stand), satisfaction with quality of life (Dartmouth Primary Care Cooperative Chart)
Notes	No significant differences in baseline characteristics No loss to follow up at end of treatment phase Outcome assessors blinded to group allocation No intervention-related withdrawals

Barreca 2004 (*Continued*)

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	High risk	C - Inadequate

Blennerhassett 2004

Methods	Single centre randomised controlled trial Randomisation performed by a person independent from the study, drawing a pre-sealed opaque envelope that specified group allocation
Participants	Australia 30 participants: 15 intervention, 15 control Participants recruited from inpatient admissions with a primary diagnosis of stroke to a rehabilitation centre 2001 to 2003, within 3 months of stroke Inclusion criteria: able to walk 10 metres and provide informed consent Exclusion criteria: deteriorating medical condition, independent community ambulation Mean age: mobility group 53.9 years (SD 19.8), upper limb group 56.3 years (SD 10.5) 56.6% male Stroke details: first or recurrent stroke, 73% ischaemic, 47% right hemiparesis Timing post stroke: mobility group 36 days (SD 25.1), upper limb group 50 days (SD 49. 2) Pre-intervention functional ability level: able to walk 10 metres, 6MWT 182 metres (SD 85)
Interventions	Mobility intervention: circuit training: sit to stand, step ups, obstacle course, plus stretching/ strengthening exercise, and some endurance training (stationary bikes/treadmill) Upper extremity intervention: reach and grasp, hand-eye co-ordination activities, stretching and strengthening exercises Both groups were during inpatient rehabilitation and additional to usual care of 5 hours per week, based on Movement Science Approach Sessions were 60 minutes, 5 times a week for 4 weeks (20 hours total) Each circuit included 10 five minute workstations Sessions delivered by a physical therapist in groups of up to 4 participants Comparison group: Blennerhassett 2004a lower limb attention control, Blennerhassett 2004b upper limb attention control
Outcomes	Outcomes recorded at baseline, which was approx 6 weeks post stroke (range 54 to 74 days) , and at 4 weeks and 6 months after training Upper-limb functional outcome measures: MAS upper arm, MAS hand, Jebsen Taylor Test of Hand Function Lower-limb functional outcome measures: 6MWT, Timed Up and Go Test, Step Test
Notes	No significant differences reported at baseline 3% lost to follow up at end of treatment phase Outcome assessors blinded to group allocation No likely intervention-related withdrawals

Blennerhassett 2004 (*Continued*)

	Average attendance was approximately 80%, with no significant difference between the groups	
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	Low risk	A - Adequate

Blennerhassett 2004a

Methods	See Blennerhassett 2004	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	Low risk	A - Adequate

Blennerhassett 2004b

Methods	See Blennerhassett 2004	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	Low risk	A - Adequate

de Sèze 2001

Methods	Single centre, pilot randomised controlled trial Randomisation table used No details of allocation concealment process
Participants	France 20 participants: 10 in experimental group, 10 in control group Participants recruited from admissions to a neurorehabilitation unit in 1998 Inclusion criteria: hemiplegia caused by a single stroke occurring at least 1 month previously, static imbalance of the trunk resulting from the stroke Exclusion criteria: multiple cerebral lesions, disorders of the locomotor system, a severe visual or auditory deficit, a severe deficit of executive functions, or deterioration in the general state of health that might alter postural performances Mean age: experimental group 63.5 years (SD 17), control group 67.7 years (SD 15) 55% male Stroke details: first stroke, 35% ischaemic, 25% right hemiparesis Time since stroke: experimental group 36.8 days (SD 25), control group 27.7 days (SD 15) Pre-intervention functional ability level: more affected - lack of postural balance
Interventions	Experimental intervention: postural training using the Bon Saint Côme device - a custom moulded orthosis that holds a pointing device, used by the participant to point to targets on a vertical panel which are activated to emit light and sound signals Intervention was during rehabilitation and additional to usual care Usual care consisted of a Bobath inspired approach and functional therapy 1 hour per day, plus a session of occupational therapy 5 days a week Sessions were 60 minutes (unclear whether 5 or 7 days per week), for 4 weeks = 20 to 28 hours Sessions were delivered individually by a physical therapist Comparison group: conventional rehabilitation for 2 hours per day
Outcomes	Outcomes were recorded at baseline, post intervention (4 weeks), and at 2 months Functional outcome measures: Sitting Equilibrium Index, Upright Equilibrium Index, Functional Ambulation Classification Motor performance measures: Trunk Control Test, Motricity Index, Ashworth Scale ADL measures: FIM
Notes	Baseline differences: postural deficit and unilateral neglect tended to be more severe in the device group, although not significant: Trunk Control Test: device group 36.6 (SD 32.3) , control group 50.4 (SD 31.9); Upright Equilibrium Index: device group 0.8 (SD 0.9), control group 1.2 (SD 1.0) No loss to follow up at end of treatment phase Outcome assessors blind to treatment group No intervention-related reasons for withdrawal Attendance: all participants completed training

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**

de Sèze 2001 (*Continued*)

Allocation concealment (selection bias)	Unclear risk	B - Unclear

Dean 1997

Methods	Single centre randomised controlled trial Randomisation was blocked; participants allocated by drawing a card from a box of 10 experimental and 10 control cards
Participants	Australia 20 participants recruited from Stroke Clubs around Sydney: 10 experimental group, 10 control group Inclusion criteria: diagnosis of stroke resulting in hemiplegia at least 12 months previous, discharged from all rehabilitation services, ability to understand instructions and give informed consent, no orthopaedic problem that would interfere with seated reaching, ability to sit unsupported for 20 minutes Exclusion criteria: none stated Mean age: experimental group 68.2 years (SD 8.2), control group 66.9 years (SD 8.2) 70% male Stroke details: not stated whether first or recurrent stroke; 40% right-sided stroke Time since stroke: experimental group: mean 6.7 years (SD 5.8), control group: mean 5.9 years (SD 2.9) Functional ability level: 6MWT: 207 seconds (SD 128)
Interventions	Experimental intervention: training designed to improve sitting balance and involving emphasis on appropriate loading of the affected leg while practising reaching tasks using the unaffected hand to grasp objects located beyond arms length Intervention was after discharge from all rehabilitation programmes Sessions were 30 minutes, 5 days per week for 2 weeks = 5 hours Sessions were delivered by a physical therapist in the participant's own home. Comparison group: upper extremity attention control - performance of cognitive manipulative tasks while seated at a table
Outcomes	Outcomes were recorded at baseline and at 2 weeks (post treatment) Limb-specific functional outcome measures: reaching distance, reaching speed, walking speed (6MWT)
Notes	No significant differences reported at baseline 5% loss to follow up at end of treatment phase Outcome assessors blind to treatment group No intervention-related reasons for withdrawal

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	Unclear risk	B - Unclear

Dean 2000

Methods	Pilot randomised controlled trial Participants grouped into matched pairs based on walking speed, then randomised by drawing cards from a box. Cards drawn by a person independent from the study
Participants	Canada 12 participants: 6 mobility intervention, 6 upper limb attention control group Participants recruited from a rehabilitation research group database Inclusion criteria: first stroke, at least 3 months post stroke, discharged from all rehabilitation services, able to attend a rehabilitation centre 3 times a week for 4 weeks, able to walk 10 metres Exclusion criteria: any medical condition that would prevent participation Mean age: experimental group 66.2 years (SD 7.7), control group 62.3 years (SD 6.6) 58% male Stroke details: not stated whether first or recurrent stroke, 58% right hemiparesis Timing post stroke: mobility group 2.3 years (SD 0.7), control group 1.3 years (SD 0.9) Pre-intervention functional ability level: 6MWT mean 235 metres (SD 139)
Interventions	Mobility intervention: lower limb circuit training of 10 workstations including sitting reach, sit to stand, stepping, heel lifts, standing balance, leg strengthening, treadmill walking, obstacle walking, slope and stair walking, plus participation in walking races and relays Intervention was after discharge from all rehabilitation programmes Sessions were 60 minutes, 3 times a week for 4 weeks = 12 hours Sessions were delivered to a group of 6 participants by two physical therapists, in an rehabilitation centre setting Upper extremity intervention: (n = 6) circuit programme designed to improve function of the affected upper limb
Outcomes	Outcomes were recorded at baseline, at 4 weeks (post treatment), and 2 months after completion of training Limb-specific functional outcome measures: 6MWT 10 metre walking speed (with and without assistive device), Step Test, Timed Up and Go Other: satisfaction with programme
Notes	No significant difference in walking velocity at baseline for total group, but after withdrawals, measures of walking speed and distance favoured the control group 6MWT: mobility group 207.9 (SD 119), upper limb group 259.6 (SD 154.6) Walking speed with assistive device (cm/sec): mobility group 70.7 (SD 41.8), upper limb group 86.1 (SD 52.6) 25% loss to follow up at end of treatment phase Outcome assessors blinded to group allocation, but may have been inadvertently unmasked 6MWT undertaken by one of the investigators Intervention-related reasons for withdrawal: 2 participants withdrew before training (one due to transport costs) Attendance: 9 participants attended at least 9 out of 12 sessions

Risk of bias

Bias	Authors' judgement	Support for judgement

Dean 2000 (*Continued*)

Allocation concealment (selection bias)	Low risk	A - Adequate

Howe 2005

Methods	Two centre, pilot randomised controlled trial Group allocation via randomised permuted blocks, with the project manager holding details of assignment until allocation by a therapist
Participants	UK 35 participants: 18 in experimental group, 17 in control group Participants recruited from admissions to an acute stroke unit between 2001 and 2002 Inclusion criteria: aged 18 and over, acute vascular stroke presenting with hemiplegia, medically stable, able to cooperate, previously independent in mobility + ADL Exclusion criteria: any history of other neurological pathology, conditions or medication affecting balance, dementia, impaired consciousness levels, concomitant medical illness or musculoskeletal condition, serious perceptual problems Mean age: experimental group: 71.5 years (SD 10.9), control group 70.7 years (SD 7.6) 51% male Stroke details: unknown if recurrent stroke included, 47% right hemiparesis Time since stroke: experimental group 26.5 days (SD 15.7), control group 23.1 days (SD 17.5) Pre-intervention functional ability level: Rivermead Mobility Index 24
Interventions	Experimental group: usual care plus exercises aimed at improving lateral weight transference in sitting and standing; this included repetition of self-initiated goal-oriented activities in various postures 16 tasks in total, with 10 repetitions of each exercise Sessions were 30 minutes, 3 times a week, for 4 weeks = 6 hours Sessions were delivered by trained physiotherapy assistants Comparison group: usual care, no details given
Outcomes	Outcomes were recorded at baseline, post treatment (4 weeks), and at 8 weeks post baseline Limb-specific functional outcome measures: sit to stand, stand to sit (time in seconds), lateral reach test (time to return to quiet sitting)
Notes	No significant differences reported at baseline 6% lost to follow up at end of treatment phase Outcome assessors blind to treatment group No intervention-related reasons for withdrawal Attendance: participants completed 10.6 sessions on average

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	Low risk	A - Adequate

Kwakkel 1999

Methods	Multi-centre randomised controlled trial Restricted randomisation (permuted blocks of nine) was applied, using random number tables for each of 3 participating hospitals Allocation was concealed by use of sealed envelopes
Participants	The Netherlands 101 participants: 31 leg training group, 33 arm training group, 37 control Participants recruited from 7 hospitals in the Netherlands, 1994 to 1997 Inclusion criteria: primary first-ever stroke in the territory of the middle cerebral artery, confirmed by CT or MRI, aged 30 to 80 years, impaired motor function of the arm and leg, inability to walk at first assessment Exclusion criteria: complicating medical history or severe deficits in communication, memory or understanding Mean age: arm group 69 years (SD 9.8), leg group 64.5 years (SD 9.7), control group 64.1 years (SD 15) 43% male Stroke details: first ever stroke, (TACI 61%, PACI, 33%, LACI 6%), 41% right hemiparesis Timing post stroke: arm group 7.2 days (SD 2.8), leg group 7.0 days (SD 2.5), control group 7.5 days (SD 2.9) Pre-intervention functional ability level: Barthel Index of 9 or lower
Interventions	Leg training group: sitting, standing and weight-bearing exercise, with an emphasis on achieving stability and improving gait velocity Treadmill training was used if available If treatment at disability level was not possible, strengthening exercises were used Arm training group: functional exercise to facilitate forced arm and hand activity such as leaning, punching a ball, grasping, reaching, dressing, hair-combing, and moving objects If treatment at disability level not possible, strengthening exercises were used Intervention was additional to basic rehabilitation, which consisted of 15 minutes arm rehabilitation, 15 minutes leg rehabilitation and 1.5 hours per week of ADL training by an occupational therapist Sessions were 30 minutes, 5 days a week for 20 weeks = 45 hours Sessions were delivered individually by a physiotherapist Comparison groups: control group - immobilisation of the paretic arm and leg by means of an inflatable pressure splint Kwakkel 1999a: arm training versus splint control Kwakkel 1999b: leg training versus splint control
Outcomes	Outcomes were recorded at baseline, and weekly between weeks 1-10, and every 2 weeks between week 11 to 26 Final measurements were at 26 weeks Results are presented for baseline, weeks 6, 12, 20 and 26 Lower limb functional outcome measures: Functional Ambulation Classification, walking speed (comfortable and maximum) Upper limb functional outcome measures: Action Research Arm test Global ADL measures: Barthel Health status/quality of life measures: Nottingham Health Profile

Kwakkel 1999 (*Continued*)

Notes	No significant differences reported at baseline 12% lost to follow up at end of treatment phase Assessors were blind to group allocation Treatment assignment was unintentionally disclosed for 10 participants (1 leg training, 4 arm training, 5 control group) No likely intervention-related reasons for withdrawal, although 2 participants refused the splint control treatment Compliance with delivery of intended amounts of training was monitored, and achieved

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	Low risk	A - Adequate

Kwakkel 1999a

Methods	See Kwakkel 1999
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	Low risk	A - Adequate

Kwakkel 1999b

Methods	See Kwakkel 1999
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Kwakkel 1999b (*Continued*)

Bias	Authors' judgement	Support for judgement
Allocation concealment (selection bias)	Low risk	A - Adequate

Langhammer 2000

Methods	Stratified, single centre randomised controlled trial Participants randomised and stratified according to gender and hemisphere site; no details of randomisation
Participants	Norway 61 participants: 33 in experimental group, 28 in control group Participants recruited from patients attending hospital in Norway between 1996 to 1997 Inclusion criteria: first-ever stroke with hemiparesis verified clinically and by CT Exclusion criteria: more than one stroke incident, subarachnoid bleeding, tumours of the brain, other severe medical conditions in combination with stroke, 5 or more points on each of the scores on the Motor Assessment Scale Mean age: 78 years (SD 9), range 49 to 75 years 59% male Stroke details: first stroke, 56% right hemiparesis Time since stroke: baseline measures taken within 3 days of admission Pre-intervention functional ability level: Barthel mean 51
Interventions	Motor Relearning Programme as per Carr and Shepherd (Carr 1987) Functional task training in ordinary settings, with ordinary tasks, using the principles of maximal repetition, task and setting variation Experimental intervention was instead of usual care Sessions were 40 minutes minimum per session, 5 days a week for as long as hospitalised, and continuing into the community, although receipt of physiotherapy in community settings was variable Sessions were delivered by hospital and outpatient physiotherapists After discharge, some participants received therapy in their own homes, at rehabilitation centres, or private outpatient departments, dependent on need Comparison group: Bobath Programme (Bobath 1990)
Outcomes	Outcomes were recorded at baseline, and at 2 weeks, 3 months, 1 year and 4 years post stroke Limb specific functional outcome measures: MAS; SMES - subscale for trunk/balance/gait; Berg Balance Scale (1 year only) Motor performance measures: SMES - subscales for leg function, arm function Global functional measures: Barthel, Nottingham Health Profile Other measures: length of stay, use of wheelchair, discharge destination
Notes	Baseline differences: control group slightly more dependent at entry, but no significant difference in MAS, SMES, or Barthel 13% loss to follow up at 3 months Blinding stated, but no description given No intervention-related reasons for withdrawal

Langhammer 2000 (*Continued*)

	Does not state monitoring of time spent in therapy	
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	Unclear risk	B - Unclear

McClellan 2004

Methods	Randomised controlled trial Randomisation by numbered, sealed, opaque envelopes
Participants	Australia 26 participants: 15 in the experimental group, 11 in the control group Participants recruited on discharge from physiotherapy services in 6 hospitals in 1 region Inclusion criteria: stroke within the past 18 months, 45 years and older, living in the community, score > 0 and < 6 on MAS, score < 6 on Item 7 or 8 of the MAS Exclusion criteria: unable to consent, uncontrolled cardiac symptoms or other medical conditions that limited exercise, or with a pacemaker Mean age: experimental group 69 years (SD 13), control group 72 years (SD 9) 50% male Stroke details: unclear whether first or recurrent stroke, 50% right hemiparesis Timing post stroke: experimental group median 6.5 months (IQR 5.5), control group median 4.5 months (IQR 3) Pre-intervention functional ability level: all participants could walk, but with difficulty
Interventions	Home based exercise programme aimed at improving mobility in standing balance and walking, based on a list of 23 activities arranged hierarchically on their challenge to balance The home programme used video self-modelling prepared on the baseline visit to the clinic to prescribe the exercise programme, telephone monitoring to encourage compliance, and 2 clinic visits for programme review Sessions were prescribed 60 minutes per day over 6 weeks = 42 hours Participants were required to keep a record of practice Comparison group: home-based exercise programme based on improving upper limb function, starting from basic movement through to functional activity, using the same self instructional video, self and telephone monitoring and clinic visits as the experimental group
Outcomes	Outcomes were recorded at baseline, post treatment (6 weeks), and 14 weeks Limb specific functional outcome measures: Functional Reach Test (centimetres), MAS walking
Notes	No baseline comparisons reported 19% lost to follow up by end of treatment phase Assessors and participants blind to group allocation No likely intervention-related reasons for withdrawal Attendance: participants self reported 75% compliance with prescribed exercises

McClellan 2004 (*Continued*)

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	Low risk	A - Adequate

Salbach 2004

Methods	Stratified, multi-centre randomised controlled trial Participants stratified into 3 groups based on comfortable walking speed Sequence of random assignments computer generated in randomly ordered blocks of 2 and 4 for each stratum Allocation maintained in sealed, opaque envelopes, prepared prior to recruitment by persons not involved in the study, and unveiled after baseline assessment and stratification
Participants	Canada 91 participants: 44 mobility group, 47 arm training group Participants were recruited from 9 hospitals and 2 rehabilitation centres in Montreal or Quebec City Inclusion criteria: first or recurrent stroke, under 1 year post stroke at recruitment, able walk 10 metres but with residual walking deficit from most recent stroke, mental competency and ability to comprehend instructions, discharged from physical rehabilitation, resident in the community Exclusion criteria: resident in permanent care facility, co-morbidity precluding participation Mean age 72 years, range 38 to 91 years 61.5% male Stroke details: first or recurrent stroke, 83% ischaemic, 56% right hemiparesis, 43% left hemiparesis, 4% bilateral Timing post stroke: mean 228 days (SD 78) Pre-intervention functional ability level: 6MWT mean 207 metres (SD 128)
Interventions	Mobility intervention: 10 walking-related tasks designed to strengthen the lower extremities and enhance walking balance, speed and distance in a progressive manner Upper extremity intervention: functional tasks such as manipulating cards, using a keyboard and writing while seated Intervention was after discharge from physical rehabilitation Sessions were 60 minutes, 3 times a week for 6 weeks = 18 hours Sessions were delivered individually by a physical or occupational therapist in a hospital outpatient or rehabilitation setting Comparison group: Salbach 2004a - upper extremity training; Salbach 2004b - lower extremity training
Outcomes	Outcomes were recorded at baseline, and at 6 weeks Limb-specific functional outcome measures: 6MWT, 5 metre walk at comfortable and maximum speed, Timed Up and Go Test, Berg Balance Scale, Activities Specific Balance Confidence Scale Global ADL: Barthel

Notes	No report of significant differences at baseline Full intention-to-treat analysis used, with post-intervention values for participants imputed Assessors were blind to group allocation Unblinding occurred for 18/42 in the mobility group and 16/43 of the upper extremity training group, but did not bias the estimated effect as evaluated by multiple linear regression model Intervention-related reasons for withdrawal: 1 unwilling to travel, 1 experienced the onset of groin pain, 2 wanted the other intervention Mobility: 86% of participants attended 17 or more sessions out of 18 Upper extremity: 72% attended 17 or more sessions. 344 people were evaluated for participation but 73% refused because they could not tolerate the travel required for attendance

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	Low risk	A - Adequate

Salbach 2004a

Methods	See Salbach 2004
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	Low risk	A - Adequate

Salbach 2004b

Methods	See Salbach 2004
Participants	
Interventions	
Outcomes	

Salbach 2004b (*Continued*)

Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	Low risk	A - Adequate

Turton 1990

Methods	Single centre, quasi-randomised trial Participants were assigned in alternate runs of 5
Participants	UK 22 participants: 12 in the experimental group, 10 in the control group Participants recruited from stroke patients discharged from inpatient care at one hospital, 1986 to 1987 Inclusion criteria: some impairment of function of the affected upper limb (i.e. less than 95% performance on a peg transfer task), able to understand instructions, lives within 25 miles of hospital Exclusion criteria: none stated Age: experimental group 59 years (SD 11.97), control group 58 years (SD 6.86) 55% male Stroke details: unclear whether first or recurrent stroke, 56% right hemiparesis Time since stroke: experimental group 24 weeks (SD 25.8), control group 16 weeks (SD 6.1) Pre-intervention disability level: 12.5/20 on Southern Motor Assessment Scale
Interventions	Usual outpatient care plus home-based exercise programme for the upper limb, based on motor relearning principles Exercises included movement and task-related reach, grasp and grip Participants were visited by an occupational therapist at home, and given exercises and repetitions Exercises were detailed in a booklet Participants were visited every 2 to 4 weeks for review Carers were involved if able and willing Participants were assigned 2 to 3 practice sessions per day (approx 1 hour in total), 7 days a week for 8 to 11 weeks = 63 hours approx Sessions were self-managed by the participant and their carer at home, with 2 to 3 home visits by an occupational therapist for programme review Comparison group: usual outpatient care (some had therapy, but others did not)
Outcomes	Outcomes were recorded at baseline and post treatment (8 to 11 weeks) Limb-specific motor performance measures: sitting part of the upper limb activity assessment - Southern Motor Group Assessment, 10 hole peg test

Turton 1990 (*Continued*)

Notes	Baseline differences: difference in time since stroke: experimental group mean of 24 weeks, and usual care mean of 16 weeks 10 Hole Peg Test performance: experimental group more disabled, home therapy group has more carers living at home No loss to follow up at end of treatment phase Outcome assessor not blinded to treatment group No intervention-related reasons for withdrawal Self-reported rates of compliance: mean 68% (SD 25). 3/12 participants rated less than 50%

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment (selection bias)	Unclear risk	D - Not used

Van Vliet 2005

Methods	Single centre randomised controlled trial Randomisation was by computer-generated random sequence provided by an independent person Blocked randomisation was used Allocations were provided in envelopes and opened after initial assessment
Participants	UK 120 participants: 60 in experimental group, 60 in control group Participants were recruited from admissions to a stroke rehabilitation ward over a period of 21 months Inclusion criteria: diagnosis of stroke, referral to physiotherapy Exclusion criteria: more than 2 weeks post stroke, unconscious on admission, unable to toilet independently prior to stroke, living more than 25 km from hospital, unable to tolerate more than 30 minutes of physical tasks required in initial assessment Mean age: experimental group 75 years (SD 9.1), control group 73.3 (SD 10.4) 50% male Stroke details: unclear whether first or recurrent stroke included, 51% right hemiparesis, 46% left hemiparesis, 3% bilateral Time since stroke: within 14 days Pre-intervention functional ability level: RMA Gross Function subscale: median/IQR experimental group 2 (1 to 6), control group 1 (1 to 4)
Interventions	Movement science-based therapy: based on the principle that skill in performance is a direct function of the amount of practice Programme involved use of everyday objects for functional training, and practice outside of delivered sessions Intervention was instead of usual care Participants received a median 23 minutes treatment by a physiotherapist per week day (IQR 13 to 32 minutes) Median total number of minutes of treatment was 365 (IQR 140 to 1160), equating to

Van Vliet 2005 (*Continued*)

	approximately 6 hours total training time Treatment was delivered by physiotherapists, occupational therapists and physiotherapy assistants, in hospital, and as an outpatient after discharge Treatment was delivered for as long as needed Comparison group: Bobath-based therapy
Outcomes	Outcomes were recorded at baseline, 4 weeks, 3 months and 6 months Limb-specific functional outcome measures: RMA Scale, Motor Assessment Scale, 6MWS, 10 hole peg test Global functional measures: Barthel, Extended ADL
Notes	Baseline differences: control group had higher median scores for Rivermead gross function, and leg and trunk subscales, and for supine to side lying, supine to sitting, balanced sitting, and sit to stand sections of the MAS; the experimental group has higher median scores for the upper arm section of the MAS 29% loss to follow up at 3 months Outcome assessors blind to treatment allocation; blinding assessed as successful Intervention-related reasons for withdrawal: 7 participants refused outcome measurement at 3 months: 5 in the experimental group and 2 in the control group, but reasons are not known

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	Low risk	A - Adequate

Winstein 2004

Methods	Stratified, single centre pilot randomised controlled trial Participants were randomised to groups within severity strata, using Orpington Prognostic Scale (1.6 to 4.1 = more severe, 4.2 to 6.8 = less severe), using a blocking factor not identified to study personnel Sealed envelopes delivered by independent person, and opened on enrolment on next eligible participant
Participants	USA 64 participants: 22 in FTP group, 21 in strength training group, and 21 in usual care group (only FTP and usual care control group data included in the review) Participants were recruited from new admissions to a neurorehabilitation services centre Inclusion criteria: aged 29 to 76, first time stroke confirmed by CT or MRI, initially from infarction in the anterior circulation, but widened early in the recruitment phase to include haemorrhagic or pontine stroke, onset of stroke from 2 to 35 days before study entry, FIM score of 40 to 80, widened to include a broader range early in recruitment phase Exclusion criteria: peripheral nerve or orthopaedic conditions that interfered with arm movements, cardiac disease that limited function, subarachnoid haemorrhage within evidence of infarction, progressive hydrocephalus, previous history of brain injury, severe aphasia, neglect, agitation or depression that could limit participation

Winstein 2004 (*Continued*)

	Age: experimental group: < 35 years = 2, 35 to 75 years = 18, control group < 35 years = 0, 35 to 75 years = 19, > 75 years = 1 52.5% male (FTP + usual care groups) Stroke details: first stroke, 85% ischaemic stroke, 62% right hemiparesis Time since stroke: experimental group 15.5 days (SD 6), control group 15.4 days (SD 5. 5) Pre-intervention disability level: 65% Orpington Score 1.6 to 4.1
Interventions	Usual care plus task-specific functional training based on the principles of motor relearning, focussing on systematic and repetitive practice of tasks Tasks were randomly ordered, and progressed in difficulty Sessions were 1 hour per day, 5 days per week, for 4 weeks = 20 hours additional to usual care Sessions were delivered by a physical therapist in hospital, and in an outpatient setting when discharged Comparison group: usual care - delivered primarily by occupational therapists, which could include muscle facilitation exercises emphasising the neurodevelopmental treatment approach, neuromuscular electrical stimulation, stretching exercises, and ADL
Outcomes	Outcomes were recorded at baseline, post treatment (4 to 6 weeks) and 9 months after stroke Limb-specific functional outcome measures: functional test of the hemiparetic upper extremity Motor performance measures: Fugl Meyer ADL measures: FIM
Notes	No significant differences reported at baseline 7% loss to follow up at end of treatment phase Outcome assessors not blinded to group allocation Intervention-related reasons for withdrawal: 1 participant in the experimental group lost interest Compliance reported as near perfect, except for 1 participant in the experimental group who, after discharge, and because of travel distance, completed only 15 of the 20 hours training

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	Low risk	A - Adequate

Yen 2005

Methods	Single centre randomised controlled trial No details of randomisation method
Participants	Taiwan 30 participants: 13 in experimental group, 17 in control group

	Participants recruited from a Department of Neurology Inclusion criteria: single stroke resulting in hemiparesis, minimum of 20 degrees of active wrist extension and 10 degrees of active finger extension, aged between 18 to 80 years, no severe aphasia or cognitive impairment Exclusion criteria: other diseases that would confound the study such as Parkinson's disease, shoulder subluxation, recurrent stroke during the training period Mean age 68 years, range 47 to 80 years 46% male Stroke details: first stroke, 60% right hemiparesis Time since stroke: experimental group 8.4 months (SD 8), control group 6.2 months (SD 7.9) Pre-intervention functional ability level: baseline mean 3.28 seconds per item on the Wolf Motor Function Test
Interventions	Practice of 15 to 20 tasks selected from a battery of 50 tasks, with task shaping (consisting of verbal feedback for small improvements), task selection (based on needs of individual), and performance assistance in the initial stages if unable to perform independently Intervention was instead of usual care Sessions were 6 hours per day; it is unclear whether there were 5 or 7 sessions per week Treatment duration was 2 weeks = 60 to 84 hours Sessions were delivered by a physical therapist; it is unclear whether sessions were group based or individual Comparison group: regular program of physical therapy including gait training, facilitation, balance training, or occupational therapy; it is unclear how much time the control group spent in therapy
Outcomes	Outcomes were recorded at baseline and post treatment (2 weeks) Limb-specific functional outcome measures: Mean time taken to complete individual items on the Wolf Motor Function Test Results for items 8 to 15 are only presented for participants able to complete them within 2 minutes
Notes	Exclusion criteria potentially applied during training No baseline differences reported No loss to follow up at end of treatment phase Blinding stated, but no description given No intervention-related reasons for withdrawal No report of attendance

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Allocation concealment (selection bias)	Unclear risk	B - Unclear

6MWS: six-metre walk speed
6MWT: six-minute walk test
ADL: activities of daily living

CT: computerised tomography
FIM: Functional Independence Measure
FTP: functional task practice
IQR: interquartile range
LACI: lacunar infarct
MAS: Motor Assessment Scale
MRI: magnetic resonance imaging
PACI: partial anterior circulation infarct
RMA: Rivermead Motor Assessment
SD: standard deviation
SMES: Sodring Motor Evaluation Scale
TACI: total anterior circulation infarcts

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Bagley 2005	Not repetition
Brown 2002	Not functional
Carey 2002	Not functional
Chan 2006	Compared against another RTT-type intervention
Chang 2000	Mixed intervention
Cirstea 2003	Compared against another RTT-type intervention
Desrosiers 2005	Mixed intervention
Duncan 2003	Main focus on exercise rather than function
Eng 2003	Main focus on exercise rather than function
Feys 1998	Not functional
Gelber 1995	Mixed intervention
Hanlon 1996	No baseline measures for function
Husemann 2004	Passive movement
Inaba 1973	Not repetition
Katz-Leurer 2006	Not functional
Kayhan 1996	Unable to contact author to determine nature of intervention

(*Continued*)

Khanna 2003	Study did not start
Kilbreath 1997	Author reports study information not available
Krutulyte 2004	No reference to randomisation Unable to contact author for confirmation
Li 2005	No functional outcome
Liao 2006	Exercise, not task based
Mudie 2002	Not functional
Nelles 2001	Not designed to evaluate intervention
Pang 2006	Mixed intervention: exercise and functional training
Platz 2001	Included participants with traumatic brain injury in sample
Pollock 2002	Not functional
Richards 1993	Mixed intervention
Richards 2004	Mixed intervention
Sunderland 1992	Mixed intervention
Theilman 2004	Compared against another intervention
Wellmon 1997	No functional outcome
Xiao 2002	Unable to determine amount of practice
Yang 2005	Interpreted as exercise, rather than functional task practice

RTT: repetitive task training

Characteristics of ongoing studies *[ordered by study ID]*

Allison 2005

Trial name or title	Pilot randomised control trial to assess the impact of additional supported standing practice on functional ability post stroke
Methods	
Participants	0 to 3 months post stroke
Interventions	Standing practice plus usual care
Outcomes	Arm and hand function, quality of life
Starting date	2001
Contact information	rhoda.allison@nhs.net
Notes	Trial complete and being submitted for publication

Askim 2005

Trial name or title	Does intensive task specific training improve balance after acute stroke?
Methods	
Participants	0 to 3 months post stroke
Interventions	Balance training plus usual care
Outcomes	Balance, sit to stand, walking speed, ADL, falls, lower limb function
Starting date	2005
Contact information	torunn.askim@ntnu.no
Notes	Trial due to complete 2012

English 2005

Trial name or title	Is task-related circuit training an effective means of providing rehabilitation to acute stroke patients?
Methods	
Participants	0 to 3 months post stroke
Interventions	Task-related circuit training
Outcomes	Balance, Motor Assessment Scale, gait speed and endurance, Nottingham Health Profile, patient satisfaction

English 2005 (*Continued*)

Starting date	2003
Contact information	Coralie.English@unisa.edu.au
Notes	Trial complete and being submitted for publication

Harris 2006

Trial name or title	Evaluation of a repetitive practice scheme to improve sit-to-stand performance following stroke
Methods	
Participants	0 to 3 months post stroke
Interventions	Repetitive sit-to-stand exercise
Outcomes	Sit to stand
Starting date	2005
Contact information	allie.turton@bristol.ac.uk
Notes	Trial due to complete 2006

Langhammer 2005

Trial name or title	Stroke: reduction of physical performance post stroke: inactivity or secondary complications?
Methods	
Participants	Post-acute rehabilitation
Interventions	Motor relearning
Outcomes	Physical endurance, strength, balance
Starting date	2003
Contact information	birgitta.langhammer@hf.hio.no
Notes	Trial closed intake autumn 2005

Miller 2002

Trial name or title	Early intensive task-specific sensory and motor training of the upper limb after acute stroke: a pilot study
Methods	
Participants	0 to 3 months post stroke
Interventions	Task-specific training of the upper limb, emphasising unimanual and bimanual functional activities
Outcomes	Motor Assessment Scale, Chedoke McMaster Impairment Inventory, Sickness Impact Profile, hand dexterity
Starting date	2002
Contact information	k.miller@unimelb.edu.au
Notes	PhD due to complete in 2007

Sherrington 2005

Trial name or title	A randomised controlled trial to evaluate task-related exercise classes for older people with impaired mobility
Methods	
Participants	173 older people, 90 with neurological problems
Interventions	Moderate intensity, circuit-style programme designed to provide repetitive, functional, task-related exercise
Outcomes	Balance, gait, sit to stand, walking endurance
Starting date	2005
Contact information	c.sherrington@fhs.usyd.edu.au
Notes	Trial submitted by end of 2006. Subgroup data available 2007

ADL: activities of daily living

DATA AND ANALYSES

Comparison 1. Upper limb function: post treatment

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Arm function	8	412	Std. Mean Difference (IV, Fixed, 95% CI)	0.17 [-0.03, 0.36]
2 Hand function	5	281	Std. Mean Difference (IV, Fixed, 95% CI)	0.16 [-0.07, 0.40]
3 Sitting balance/reach	5	210	Std. Mean Difference (IV, Fixed, 95% CI)	0.23 [-0.05, 0.50]

Comparison 2. Upper limb function: follow up

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 All outcomes	6	246	Std. Mean Difference (IV, Fixed, 95% CI)	0.08 [-0.17, 0.33]
1.1 Under 6 months post treatment	2	51	Std. Mean Difference (IV, Fixed, 95% CI)	0.50 [-0.06, 1.06]
1.2 6 to 12 months post treatment	4	195	Std. Mean Difference (IV, Fixed, 95% CI)	-0.02 [-0.31, 0.26]

Comparison 3. Upper limb function: subgroup analyses

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Dosage of task practice	11	484	Std. Mean Difference (IV, Fixed, 95% CI)	0.23 [0.05, 0.41]
1.1 0 to 20 hours	8	371	Std. Mean Difference (IV, Fixed, 95% CI)	0.18 [-0.02, 0.39]
1.2 More than 20 hours	3	113	Std. Mean Difference (IV, Fixed, 95% CI)	0.40 [0.03, 0.78]
2 Time since stroke	11	484	Std. Mean Difference (IV, Fixed, 95% CI)	0.23 [0.05, 0.41]
2.1 0 to 15 days	4	239	Std. Mean Difference (IV, Fixed, 95% CI)	0.21 [-0.04, 0.47]
2.2 16 days to 6 months	4	105	Std. Mean Difference (IV, Fixed, 95% CI)	0.24 [-0.14, 0.63]
2.3 More than 6 months	3	140	Std. Mean Difference (IV, Fixed, 95% CI)	0.25 [-0.08, 0.59]
3 Type of intervention	11	484	Std. Mean Difference (IV, Fixed, 95% CI)	0.23 [0.05, 0.41]
3.1 Whole therapy	2	138	Std. Mean Difference (IV, Fixed, 95% CI)	0.16 [-0.18, 0.49]
3.2 Mixed training	6	274	Std. Mean Difference (IV, Fixed, 95% CI)	0.20 [-0.04, 0.44]
3.3 Single task training	3	72	Std. Mean Difference (IV, Fixed, 95% CI)	0.51 [0.03, 0.99]

Comparison 4. Lower limb function: post treatment

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Walking distance: change from baseline	3	130	Mean Difference (IV, Random, 95% CI)	54.59 [17.50, 91.68]
2 Walking speed	5	263	Std. Mean Difference (IV, Fixed, 95% CI)	0.29 [0.04, 0.53]
3 Functional ambulation	5	238	Std. Mean Difference (IV, Fixed, 95% CI)	0.25 [-0.00, 0.51]
4 Sit to stand: post treatment/change from baseline	7	346	Standardised effect (Fixed, 95% CI)	0.35 [0.13, 0.56]
5 Lower limb functional measures	4	177	Std. Mean Difference (IV, Fixed, 95% CI)	0.20 [-0.10, 0.50]
6 Standing balance/reach	3	132	Std. Mean Difference (IV, Fixed, 95% CI)	0.29 [-0.06, 0.63]

Comparison 5. Lower limb function: follow up

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 All outcomes	7	250	Std. Mean Difference (IV, Fixed, 95% CI)	0.03 [-0.22, 0.28]
1.1 Under 6 months post treatment	4	80	Std. Mean Difference (IV, Fixed, 95% CI)	0.11 [-0.33, 0.56]
1.2 6 to 12 months post treatment	3	170	Std. Mean Difference (IV, Fixed, 95% CI)	-0.01 [-0.32, 0.29]

Comparison 6. Lower limb function: subgroup analyses

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Dosage of task practice	10	416	Std. Mean Difference (IV, Fixed, 95% CI)	0.26 [0.06, 0.45]
1.1 0 to 20 hours	8	336	Std. Mean Difference (IV, Fixed, 95% CI)	0.19 [-0.03, 0.40]
1.2 More than 20 hours	2	80	Std. Mean Difference (IV, Fixed, 95% CI)	0.56 [0.11, 1.01]
2 Time since stroke	10	416	Std. Mean Difference (IV, Fixed, 95% CI)	0.26 [0.06, 0.45]
2.1 0 to 15 days	3	197	Std. Mean Difference (IV, Fixed, 95% CI)	0.24 [-0.04, 0.52]
2.2 16 days to 6 months	4	101	Std. Mean Difference (IV, Fixed, 95% CI)	0.29 [-0.11, 0.69]
2.3 More than 6 months	3	118	Std. Mean Difference (IV, Fixed, 95% CI)	0.26 [-0.11, 0.62]
3 Type of intervention	10	416	Std. Mean Difference (IV, Fixed, 95% CI)	0.26 [0.06, 0.45]
3.1 Whole therapy	2	138	Std. Mean Difference (IV, Fixed, 95% CI)	0.10 [-0.24, 0.43]
3.2 Mixed training	5	210	Std. Mean Difference (IV, Fixed, 95% CI)	0.48 [0.20, 0.75]
3.3 Single task training	3	68	Std. Mean Difference (IV, Fixed, 95% CI)	-0.07 [-0.55, 0.41]

Comparison 7. Global motor function

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Global motor function scales	2	138	Std. Mean Difference (IV, Fixed, 95% CI)	0.32 [-0.01, 0.66]

Comparison 8. Secondary outcomes

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Activities of daily living function	5	325	Std. Mean Difference (IV, Fixed, 95% CI)	0.29 [0.07, 0.51]
2 Upper limb impairment	3	184	Std. Mean Difference (IV, Fixed, 95% CI)	0.14 [-0.15, 0.43]
3 Lower limb impairment	2	73	Std. Mean Difference (IV, Fixed, 95% CI)	0.13 [-0.33, 0.59]
4 Quality of life/health status	3	148	Std. Mean Difference (IV, Fixed, 95% CI)	0.08 [-0.24, 0.41]

Comparison 9. Sensitivity analyses

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Allocation concealment	13	512	Std. Mean Difference (IV, Fixed, 95% CI)	0.38 [0.21, 0.56]
1.1 Adequate	8	368	Std. Mean Difference (IV, Fixed, 95% CI)	0.37 [0.17, 0.58]
1.2 Inadequate/unclear	5	144	Std. Mean Difference (IV, Fixed, 95% CI)	0.40 [0.07, 0.74]
2 Comparison groups	13	512	Std. Mean Difference (IV, Fixed, 95% CI)	0.38 [0.21, 0.56]
2.1 Usual care	7	283	Std. Mean Difference (IV, Fixed, 95% CI)	0.27 [0.03, 0.50]
2.2 Attention control	6	229	Std. Mean Difference (IV, Fixed, 95% CI)	0.53 [0.26, 0.80]
3 Equivalence of therapy time	13	512	Std. Mean Difference (IV, Fixed, 95% CI)	0.38 [0.21, 0.56]
3.1 Additional therapy time	2	62	Std. Mean Difference (IV, Fixed, 95% CI)	0.09 [-0.41, 0.59]
3.2 Equivalent therapy time	11	450	Std. Mean Difference (IV, Fixed, 95% CI)	0.42 [0.23, 0.61]

Analysis 1.1. Comparison 1 Upper limb function: post treatment, Outcome 1 Arm function.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 1 Upper limb function: post treatment

Outcome: 1 Arm function

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
Blennerhassett 2004a	15	4.9 (1.9)	15	5.1 (1.5)		7.4 %	-0.11 [-0.83, 0.60]
Kwakkel 1999b	27	20 (22)	34	10 (19)		14.4 %	0.48 [-0.03, 1.00]
Langhammer 2000	29	4.7 (2)	24	4.1 (2.3)		12.8 %	0.28 [-0.27, 0.82]
Salbach 2004b	47	29 (17)	44	28 (19)		22.3 %	0.06 [-0.36, 0.47]
Turton 1990	12	13.83 (6)	10	12.25 (7.2)		5.3 %	0.23 [-0.61, 1.07]
Van Vliet 2005	42	3.88 (2.23)	43	3.69 (2.38)		20.9 %	0.08 [-0.34, 0.51]
Winstein 2004	20	9.58 (5.7)	20	9.47 (6.3)		9.8 %	0.02 [-0.60, 0.64]
Yen 2005	13	-2.57 (0.93)	17	-3.06 (1.54)		7.1 %	0.36 [-0.37, 1.09]
Total (95% CI)	**205**		**207**			**100.0 %**	**0.17 [-0.03, 0.36]**

Heterogeneity: $Chi^2 = 3.18$, df = 7 (P = 0.87); $I^2 = 0.0\%$

Test for overall effect: Z = 1.67 (P = 0.095)

Test for subgroup differences: Not applicable

Analysis 1.2. Comparison 1 Upper limb function: post treatment, Outcome 2 Hand function.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 1 Upper limb function: post treatment

Outcome: 2 Hand function

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
Blennerhassett 2004a	15	4.7 (2.5)	15	4.9 (2.1)		10.8 %	-0.08 [-0.80, 0.63]
Langhammer 2000	29	4.6 (1.9)	24	3.9 (2.3)		18.6 %	0.33 [-0.21, 0.87]
Salbach 2004b	47	-9 (3)	44	-10 (4)		32.3 %	0.28 [-0.13, 0.70]
Turton 1990	12	-43.5 (20.8)	10	-41.1 (20.1)		7.8 %	-0.11 [-0.95, 0.73]
Van Vliet 2005	42	4.3 (2.41)	43	4.07 (2.56)		30.5 %	0.09 [-0.33, 0.52]
Total (95% CI)	**145**		**136**			**100.0 %**	**0.16 [-0.07, 0.40]**

Heterogeneity: $Chi^2 = 1.66$, df = 4 (P = 0.80); $I^2 = 0.0\%$

Test for overall effect: Z = 1.36 (P = 0.18)

Test for subgroup differences: Not applicable

Analysis 1.3. Comparison 1 Upper limb function: post treatment, Outcome 3 Sitting balance/reach.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 1 Upper limb function: post treatment

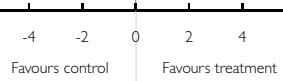
Outcome: 3 Sitting balance/reach

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
de S ze 2001	10	3.3 (0.8)	10	3 (0.8)		9.6 %	0.36 [-0.53, 1.24]
Dean 1997	10	12 (0.95)	9	10.8 (0.9)		7.5 %	1.24 [0.23, 2.24]
Howe 2005	15	-1.9 (0.8)	18	-2.1 (0.7)		15.9 %	0.26 [-0.43, 0.95]
Langhammer 2000	29	5.4 (0.9)	24	5 (1.5)		25.4 %	0.33 [-0.22, 0.87]
Van Vliet 2005	42	4.54 (1.49)	43	4.63 (1.42)		41.6 %	-0.06 [-0.49, 0.36]
Total (95% CI)	**106**		**104**			**100.0 %**	**0.23 [-0.05, 0.50]**

Heterogeneity: Chi^2 = 5.88, df = 4 (P = 0.21); I^2 =32%

Test for overall effect: Z = 1.61 (P = 0.11)

Test for subgroup differences: Not applicable



Analysis 2.1. Comparison 2 Upper limb function: follow up, Outcome 1 All outcomes.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 2 Upper limb function: follow up

Outcome: 1 All outcomes

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 Under 6 months post treatment							
de S ze 2001	10	3.6 (0.5)	10	3.4 (0.6)		8.1 %	0.35 [-0.54, 1.23]
Howe 2005	15	2.5 (1.3)	16	1.9 (0.5)		12.1 %	0.60 [-0.12, 1.32]
Subtotal (95% CI)	**25**		**26**			**20.2 %**	**0.50 [-0.06, 1.06]**
Heterogeneity: Chi^2 = 0.19, df = 1 (P = 0.66); I^2 =0.0%							
Test for overall effect: Z = 1.75 (P = 0.080)							
2 6 to 12 months post treatment							
Blennerhassett 2004a	10	-23.6 (12.2)	11	-31 (33.2)		8.5 %	0.28 [-0.58, 1.14]
Langhammer 2000	27	3.9 (2.5)	27	3.5 (2.8)		22.1 %	0.15 [-0.39, 0.68]
Van Vliet 2005	42	3.45 (2.4)	45	3.77 (2.37)		35.7 %	-0.13 [-0.55, 0.29]
Winstein 2004	17	9.67 (5.8)	16	10.98 (6.2)		13.5 %	-0.21 [-0.90, 0.47]
Subtotal (95% CI)	**96**		**99**			**79.8 %**	**-0.02 [-0.31, 0.26]**
Heterogeneity: Chi^2 = 1.42, df = 3 (P = 0.70); I^2 =0.0%							
Test for overall effect: Z = 0.17 (P = 0.86)							
Total (95% CI)	**121**		**125**			**100.0 %**	**0.08 [-0.17, 0.33]**
Heterogeneity: Chi^2 = 4.30, df = 5 (P = 0.51); I^2 =0.0%							
Test for overall effect: Z = 0.63 (P = 0.53)							
Test for subgroup differences: Chi^2 = 2.69, df = 1 (P = 0.10), I^2 =63%							

Analysis 3.1. Comparison 3 Upper limb function: subgroup analyses, Outcome 1 Dosage of task practice.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 3 Upper limb function: subgroup analyses

Outcome: 1 Dosage of task practice

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 0 to 20 hours							
Blennerhassett 2004a	15	4.5 (2.5)	15	4.1 (2.7)		6.3 %	0.15 [-0.57, 0.87]
de S ze 2001	10	3.3 (0.8)	10	3 (0.8)		4.1 %	0.36 [-0.53, 1.24]
Dean 1997	10	1200 (94.9)	9	1080 (90)		3.2 %	1.24 [0.23, 2.24]
Howe 2005	15	-1.9 (0.8)	18	-2.1 (0.7)		6.8 %	0.26 [-0.43, 0.95]
Langhammer 2000	29	4.7 (2)	24	4.1 (2.3)		11.0 %	0.28 [-0.27, 0.82]
Salbach 2004b	47	29 (17)	44	28 (19)		19.2 %	0.06 [-0.36, 0.47]
Van Vliet 2005	42	3.88 (2.23)	43	3.69 (2.38)		17.9 %	0.08 [-0.34, 0.51]
Winstein 2004	20	9.58 (5.7)	20	9.47 (6.3)		8.4 %	0.02 [-0.60, 0.64]
Subtotal (95% CI)	**188**		**183**			**77.0 %**	**0.18 [-0.02, 0.39]**
Heterogeneity: Chi² = 5.43, df = 7 (P = 0.61); I² =0.0%							
Test for overall effect: Z = 1.72 (P = 0.085)							
2 More than 20 hours							
Kwakkel 1999b	27	20 (22)	34	10 (19)		12.3 %	0.48 [-0.03, 1.00]
Turton 1990	12	13.83 (6)	10	12.25 (7.2)		4.6 %	0.23 [-0.61, 1.07]
Yen 2005	13	-2.57 (0.93)	17	-3.06 (1.54)		6.1 %	0.36 [-0.37, 1.09]
Subtotal (95% CI)	**52**		**61**			**23.0 %**	**0.40 [0.03, 0.78]**
Heterogeneity: Chi² = 0.27, df = 2 (P = 0.87); I² =0.0%							
Test for overall effect: Z = 2.10 (P = 0.036)							
Total (95% CI)	**240**		**244**			**100.0 %**	**0.23 [0.05, 0.41]**
Heterogeneity: Chi² = 6.73, df = 10 (P = 0.75); I² =0.0%							
Test for overall effect: Z = 2.52 (P = 0.012)							
Test for subgroup differences: Chi² = 1.03, df = 1 (P = 0.31), I² =3%							

Analysis 3.2. Comparison 3 Upper limb function: subgroup analyses, Outcome 2 Time since stroke.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 3 Upper limb function: subgroup analyses

Outcome: 2 Time since stroke

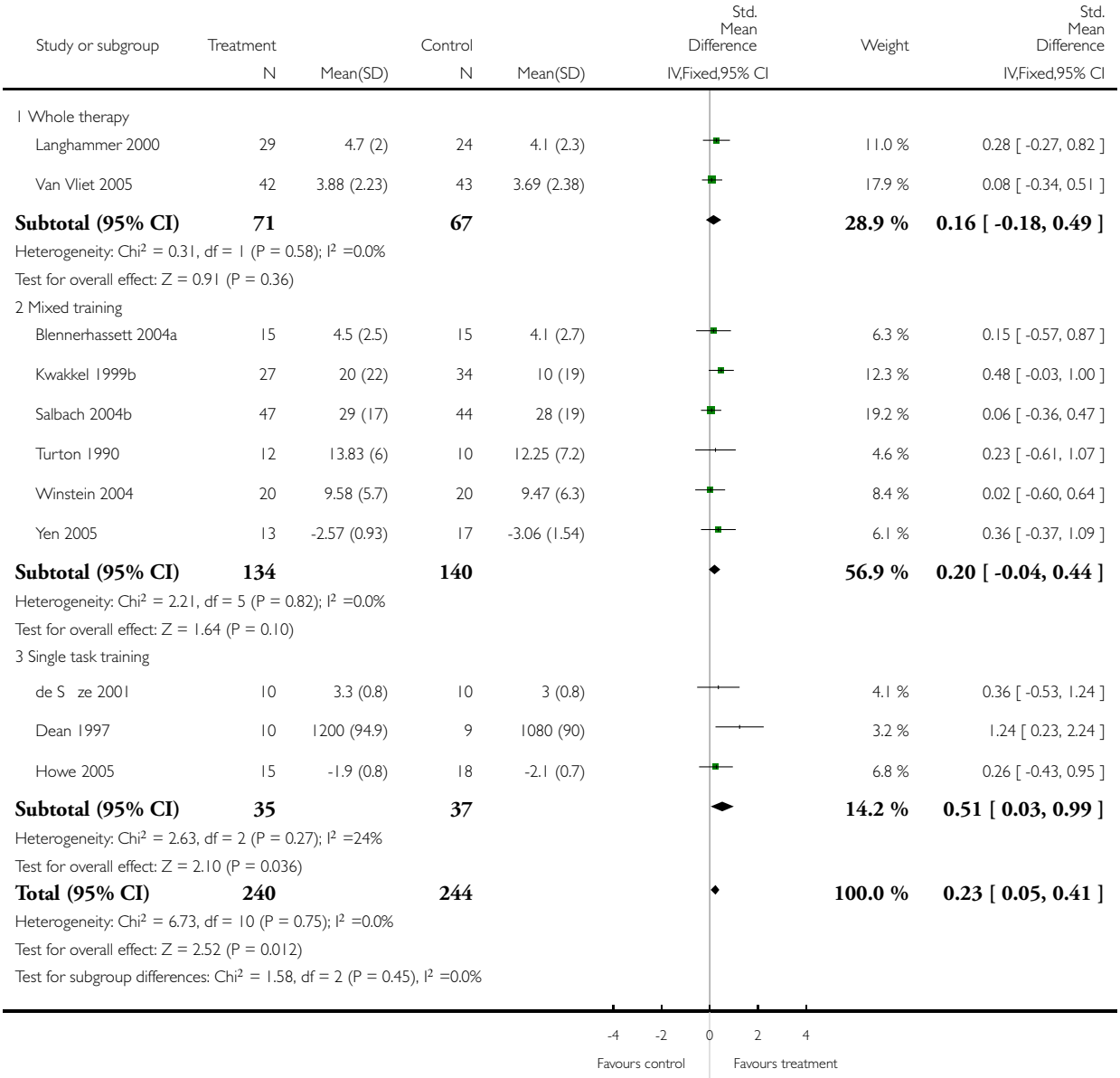
Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 0 to 15 days							
Kwakkel 1999b	27	20 (22)	34	10 (19)		12.3 %	0.48 [-0.03, 1.00]
Langhammer 2000	29	4.7 (2)	24	4.1 (2.3)		11.0 %	0.28 [-0.27, 0.82]
Van Vliet 2005	42	3.88 (2.23)	43	3.69 (2.38)		17.9 %	0.08 [-0.34, 0.51]
Winstein 2004	20	9.58 (5.7)	20	9.47 (6.3)		8.4 %	0.02 [-0.60, 0.64]
Subtotal (95% CI)	**118**		**121**			**49.6 %**	**0.21 [-0.04, 0.47]**
Heterogeneity: Chi² = 1.87, df = 3 (P = 0.60); I² =0.0%							
Test for overall effect: Z = 1.64 (P = 0.10)							
2 16 days to 6 months							
Blennerhassett 2004a	15	4.5 (2.5)	15	4.1 (2.7)		6.3 %	0.15 [-0.57, 0.87]
de S ze 2001	10	3.3 (0.8)	10	3 (0.8)		4.1 %	0.36 [-0.53, 1.24]
Howe 2005	15	-1.9 (0.8)	18	-2.1 (0.7)		6.8 %	0.26 [-0.43, 0.95]
Turton 1990	12	13.83 (6)	10	12.25 (7.2)		4.6 %	0.23 [-0.61, 1.07]
Subtotal (95% CI)	**52**		**53**			**21.9 %**	**0.24 [-0.14, 0.63]**
Heterogeneity: Chi² = 0.13, df = 3 (P = 0.99); I² =0.0%							
Test for overall effect: Z = 1.23 (P = 0.22)							
3 More than 6 months							
Dean 1997	10	1200 (94.9)	9	1080 (90)		3.2 %	1.24 [0.23, 2.24]
Salbach 2004b	47	29 (17)	44	28 (19)		19.2 %	0.06 [-0.36, 0.47]
Yen 2005	13	-2.57 (0.93)	17	-3.06 (1.54)		6.1 %	0.36 [-0.37, 1.09]
Subtotal (95% CI)	**70**		**70**			**28.5 %**	**0.25 [-0.08, 0.59]**
Heterogeneity: Chi² = 4.68, df = 2 (P = 0.10); I² =57%							
Test for overall effect: Z = 1.48 (P = 0.14)							
Total (95% CI)	**240**		**244**			**100.0 %**	**0.23 [0.05, 0.41]**
Heterogeneity: Chi² = 6.73, df = 10 (P = 0.75); I² =0.0%							
Test for overall effect: Z = 2.52 (P = 0.012)							
Test for subgroup differences: Chi² = 0.04, df = 2 (P = 0.98), I² =0.0%							

Analysis 3.3. Comparison 3 Upper limb function: subgroup analyses, Outcome 3 Type of intervention.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 3 Upper limb function: subgroup analyses

Outcome: 3 Type of intervention



Analysis 4.1. Comparison 4 Lower limb function: post treatment, Outcome 1 Walking distance: change from baseline.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 4 Lower limb function: post treatment

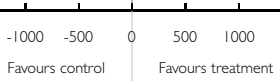
Outcome: 1 Walking distance: change from baseline

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Random,95% CI	Weight	Mean Difference IV,Random,95% CI
Dean 2000	5	42.03 (30.42)	4	4.76 (4.9)		38.5 %	37.27 [10.18, 64.36]
Salbach 2004a	44	40 (72)	47	5 (66)		37.8 %	35.00 [6.56, 63.44]
Blennerhassett 2004b	15	221 (65.4)	15	107 (85.6)		23.7 %	114.00 [59.48, 168.52]
Total (95% CI)	**64**		**66**			**100.0 %**	**54.59 [17.50, 91.68]**

Heterogeneity: $Tau^2 = 737.75$; $Chi^2 = 6.94$, df = 2 (P = 0.03); $I^2 = 71\%$

Test for overall effect: Z = 2.88 (P = 0.0039)

Test for subgroup differences: Not applicable



Analysis 4.2. Comparison 4 Lower limb function: post treatment, Outcome 2 Walking speed.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 4 Lower limb function: post treatment

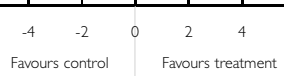
Outcome: 2 Walking speed

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
Dean 1997	10	33.8 (18.6)	8	29.4 (33.9)		6.9 %	0.16 [-0.77, 1.09]
Dean 2000	5	80.2 (42.8)	4	88.4 (52.2)		3.4 %	-0.15 [-1.47, 1.16]
Kwakkel 1999a	26	0.65 (0.46)	34	0.37 (0.41)		21.8 %	0.64 [0.12, 1.16]
Salbach 2004a	44	0.78 (0.4)	47	0.64 (0.37)		34.8 %	0.36 [-0.05, 0.78]
Van Vliet 2005	42	12.19 (9.05)	43	11.75 (7.88)		33.1 %	0.05 [-0.37, 0.48]
Total (95% CI)	**127**		**136**			**100.0 %**	**0.29 [0.04, 0.53]**

Heterogeneity: $Chi^2 = 3.54$, df = 4 (P = 0.47); $I^2 = 0.0\%$

Test for overall effect: Z = 2.30 (P = 0.021)

Test for subgroup differences: Not applicable



Analysis 4.3. Comparison 4 Lower limb function: post treatment, Outcome 3 Functional ambulation.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 4 Lower limb function: post treatment

Outcome: 3 Functional ambulation

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
de S ze 2001	10	2.6 (1.4)	10	1.6 (1.5)		8.1 %	0.66 [-0.25, 1.57]
Kwakkel 1999a	25	4 (1)	34	3 (2)		23.8 %	0.60 [0.07, 1.12]
Langhammer 2000	29	4 (1.6)	24	3.8 (2)		22.7 %	0.11 [-0.43, 0.65]
McClellan 2004	12	4.3 (1.2)	9	4.7 (1)		8.7 %	-0.34 [-1.21, 0.53]
Van Vliet 2005	42	3.7 (1.62)	43	3.39 (1.93)		36.6 %	0.17 [-0.25, 0.60]
Total (95% CI)	**118**		**120**			**100.0 %**	**0.25 [0.00, 0.51]**

Heterogeneity: $Chi^2 = 4.60$, df = 4 (P = 0.33); $I^2 = 13\%$

Test for overall effect: Z = 1.93 (P = 0.054)

Test for subgroup differences: Not applicable

Analysis 4.4. Comparison 4 Lower limb function: post treatment, Outcome 4 Sit to stand: post treatment/change from baseline.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 4 Lower limb function: post treatment

Outcome: 4 Sit to stand: post treatment/change from baseline

Study or subgroup	Treatment N	Control N	Standardised effect (SE)	Standardised effect IV,Fixed,95% CI	Weight	Standardised effect IV,Fixed,95% CI
Barreca 2004	25	23	0.8715 (0.344)		10.4 %	0.87 [0.20, 1.55]
Blennerhassett 2004b	15	15	0.7 (0.3776)		8.7 %	0.70 [-0.04, 1.44]
Dean 2000	5	4	0.57 (0.6939)		2.6 %	0.57 [-0.79, 1.93]
Howe 2005	15	15	-0.25 (0.3673)		9.2 %	-0.25 [-0.97, 0.47]
Langhammer 2000	29	24	0.3 (0.2781)		16.0 %	0.30 [-0.25, 0.85]
Salbach 2004a	44	47	0.24 (0.2117)		27.6 %	0.24 [-0.17, 0.65]
Van Vliet 2005	42	43	0.35 (0.2194)		25.7 %	0.35 [-0.08, 0.78]
Total (95% CI)	**175**	**171**			**100.0 %**	**0.35 [0.13, 0.56]**

Heterogeneity: $Chi^2 = 6.23$, df = 6 (P = 0.40); $I^2 = 4\%$

Test for overall effect: Z = 3.12 (P = 0.0018)

Test for subgroup differences: Not applicable

Analysis 4.5. Comparison 4 Lower limb function: post treatment, Outcome 5 Lower limb functional measures.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 4 Lower limb function: post treatment

Outcome: 5 Lower limb functional measures

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
Blennerhassett 2004b	15	11.1 (5)	15	8.5 (4.6)		16.6 %	0.53 [-0.20, 1.26]
Dean 2000	5	9.8 (4)	4	5.8 (4.3)		4.4 %	0.86 [-0.56, 2.28]
Langhammer 2000	29	41 (18)	24	39 (21)		30.2 %	0.10 [-0.44, 0.64]
Van Vliet 2005	42	5.62 (4.02)	43	5.24 (4.3)		48.8 %	0.09 [-0.34, 0.52]
Total (95% CI)	**91**		**86**			**100.0 %**	**0.20 [-0.10, 0.50]**

Heterogeneity: Chi^2 = 1.99, df = 3 (P = 0.58); I^2 =0.0%

Test for overall effect: Z = 1.32 (P = 0.19)

Test for subgroup differences: Not applicable

Analysis 4.6. Comparison 4 Lower limb function: post treatment, Outcome 6 Standing balance/reach.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 4 Lower limb function: post treatment

Outcome: 6 Standing balance/reach

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
de S ze 2001	10	2.4 (1.6)	10	2 (0.8)		15.2 %	0.30 [-0.58, 1.19]
McClellan 2004	12	21.9 (9.4)	9	17.8 (7.4)		15.4 %	0.46 [-0.42, 1.33]
Salbach 2004a	44	44 (11)	47	41 (13)		69.5 %	0.25 [-0.17, 0.66]
Total (95% CI)	**66**		**66**			**100.0 %**	**0.29 [-0.06, 0.63]**

Heterogeneity: Chi^2 = 0.18, df = 2 (P = 0.91); I^2 =0.0%

Test for overall effect: Z = 1.64 (P = 0.10)

Test for subgroup differences: Not applicable

Analysis 5.1. Comparison 5 Lower limb function: follow up, Outcome 1 All outcomes.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 5 Lower limb function: follow up

Outcome: 1 All outcomes

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 Under 6 months post treatment							
de S ze 2001	10	3.1 (1.2)	10	2.5 (1.2)		7.8 %	0.48 [-0.41, 1.37]
Dean 2000	4	84 (46.7)	4	81.5 (47.2)		3.2 %	0.05 [-1.34, 1.43]
Howe 2005	14	-4.2 (7.3)	15	-2.9 (2.5)		11.7 %	-0.24 [-0.97, 0.50]
McClellan 2004	13	20.2 (9.4)	10	17.7 (8.4)		9.1 %	0.27 [-0.56, 1.10]
Subtotal (95% CI)	**41**		**39**			**31.9 %**	**0.11 [-0.33, 0.56]**
Heterogeneity: Chi^2 = 1.66, df = 3 (P = 0.65); I^2 =0.0%							
Test for overall effect: Z = 0.50 (P = 0.62)							
2 6 to 12 months post treatment							
Blennerhassett 2004b	15	416 (171)	14	313 (154)		11.2 %	0.61 [-0.13, 1.36]
Langhammer 2000	27	3.1 (2.3)	27	3 (2.3)		21.9 %	0.04 [-0.49, 0.58]
Van Vliet 2005	42	3.24 (1.96)	45	3.7 (1.72)		35.0 %	-0.25 [-0.67, 0.17]
Subtotal (95% CI)	**84**		**86**			**68.1 %**	**-0.01 [-0.32, 0.29]**
Heterogeneity: Chi^2 = 3.93, df = 2 (P = 0.14); I^2 =49%							
Test for overall effect: Z = 0.08 (P = 0.93)							
Total (95% CI)	**125**		**125**			**100.0 %**	**0.03 [-0.22, 0.28]**
Heterogeneity: Chi^2 = 5.80, df = 6 (P = 0.45); I^2 =0.0%							
Test for overall effect: Z = 0.21 (P = 0.83)							
Test for subgroup differences: Chi^2 = 0.21, df = 1 (P = 0.65), I^2 =0.0%							

Analysis 6.1. Comparison 6 Lower limb function: subgroup analyses, Outcome 1 Dosage of task practice.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 6 Lower limb function: subgroup analyses

Outcome: 1 Dosage of task practice

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 0 to 20 hours							
Blennerhassett 2004b	15	404 (101)	15	288 (124)		6.5 %	1.00 [0.23, 1.76]
de S ze 2001	10	70.3 (24.2)	10	70.4 (21.7)		4.9 %	0.00 [-0.88, 0.87]
Dean 1997	10	33.8 (18.6)	8	29.4 (33.9)		4.4 %	0.16 [-0.77, 1.09]
Dean 2000	5	84 (46.7)	4	81.5 (47.2)		2.2 %	0.05 [-1.27, 1.36]
Howe 2005	15	-3.3 (3.7)	15	-2.6 (1.2)		7.3 %	-0.25 [-0.97, 0.47]
Langhammer 2000	29	4 (1.6)	24	3.8 (2)		13.0 %	0.11 [-0.43, 0.65]
Salbach 2004a	44	249 (136)	47	209 (132)		22.2 %	0.30 [-0.12, 0.71]
Van Vliet 2005	42	5.62 (4.02)	43	5.24 (4.3)		21.0 %	0.09 [-0.34, 0.52]
Subtotal (95% CI)	**170**		**166**			**81.5 %**	**0.19 [-0.03, 0.40]**
Heterogeneity: Chi^2 = 6.49, df = 7 (P = 0.48); I^2 =0.0%							
Test for overall effect: Z = 1.71 (P = 0.088)							
2 More than 20 hours							
Kwakkel 1999a	25	4 (1)	34	3 (2)		13.6 %	0.60 [0.07, 1.12]
McClellan 2004	12	21.9 (9.4)	9	17.8 (7.4)		4.9 %	0.46 [-0.42, 1.33]
Subtotal (95% CI)	**37**		**43**			**18.5 %**	**0.56 [0.11, 1.01]**
Heterogeneity: Chi^2 = 0.07, df = 1 (P = 0.79); I^2 =0.0%							
Test for overall effect: Z = 2.42 (P = 0.015)							
Total (95% CI)	**207**		**209**			**100.0 %**	**0.26 [0.06, 0.45]**
Heterogeneity: Chi^2 = 8.67, df = 9 (P = 0.47); I^2 =0.0%							
Test for overall effect: Z = 2.58 (P = 0.0098)							
Test for subgroup differences: Chi^2 = 2.11, df = 1 (P = 0.15), I^2 =53%							

Analysis 6.2. Comparison 6 Lower limb function: subgroup analyses, Outcome 2 Time since stroke.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 6 Lower limb function: subgroup analyses

Outcome: 2 Time since stroke

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 0 to 15 days							
Kwakkel 1999a	25	4 (1)	34	3 (2)		13.6 %	0.60 [0.07, 1.12]
Langhammer 2000	29	4 (1.6)	24	3.8 (2)		13.0 %	0.11 [-0.43, 0.65]
Van Vliet 2005	42	5.62 (4.02)	43	5.24 (4.3)		21.0 %	0.09 [-0.34, 0.52]
Subtotal (95% CI)	**96**		**101**			**47.5 %**	**0.24 [-0.04, 0.52]**
Heterogeneity: Chi² = 2.45, df = 2 (P = 0.29); I² =18%							
Test for overall effect: Z = 1.67 (P = 0.095)							
2 16 days to 6 months							
Blennerhassett 2004b	15	404 (101)	15	288 (124)		6.5 %	1.00 [0.23, 1.76]
de S ze 2001	10	70.3 (24.2)	10	70.4 (21.7)		4.9 %	0.00 [-0.88, 0.87]
Howe 2005	15	-3.3 (3.7)	15	-2.6 (1.2)		7.3 %	-0.25 [-0.97, 0.47]
McClellan 2004	12	21.9 (9.4)	9	17.8 (7.4)		4.9 %	0.46 [-0.42, 1.33]
Subtotal (95% CI)	**52**		**49**			**23.7 %**	**0.29 [-0.11, 0.69]**
Heterogeneity: Chi² = 6.01, df = 3 (P = 0.11); I² =50%							
Test for overall effect: Z = 1.42 (P = 0.16)							
3 More than 6 months							
Dean 1997	10	33.8 (18.6)	8	29.4 (33.9)		4.4 %	0.16 [-0.77, 1.09]
Dean 2000	5	84 (46.7)	4	81.5 (47.2)		2.2 %	0.05 [-1.27, 1.36]
Salbach 2004a	44	249 (136)	47	209 (132)		22.2 %	0.30 [-0.12, 0.71]
Subtotal (95% CI)	**59**		**59**			**28.8 %**	**0.26 [-0.11, 0.62]**
Heterogeneity: Chi² = 0.17, df = 2 (P = 0.92); I² =0.0%							
Test for overall effect: Z = 1.38 (P = 0.17)							
Total (95% CI)	**207**		**209**			**100.0 %**	**0.26 [0.06, 0.45]**
Heterogeneity: Chi² = 8.67, df = 9 (P = 0.47); I² =0.0%							
Test for overall effect: Z = 2.58 (P = 0.0098)							
Test for subgroup differences: Chi² = 0.04, df = 2 (P = 0.98), I² =0.0%							

Analysis 6.3. Comparison 6 Lower limb function: subgroup analyses, Outcome 3 Type of intervention.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 6 Lower limb function: subgroup analyses

Outcome: 3 Type of intervention

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 Whole therapy							
Langhammer 2000	29	4 (1.6)	24	3.8 (2)		13.0 %	0.11 [-0.43, 0.65]
Van Vliet 2005	42	5.62 (4.02)	43	5.24 (4.3)		21.0 %	0.09 [-0.34, 0.52]
Subtotal (95% CI)	**71**		**67**			**33.9 %**	**0.10 [-0.24, 0.43]**
Heterogeneity: Chi^2 = 0.00, df = 1 (P = 0.96); I^2 =0.0%							
Test for overall effect: Z = 0.57 (P = 0.57)							
2 Mixed training							
Blennerhassett 2004b	15	404 (101)	15	288 (124)		6.5 %	1.00 [0.23, 1.76]
Dean 2000	5	84 (46.7)	4	81.5 (47.2)		2.2 %	0.05 [-1.27, 1.36]
Kwakkel 1999a	25	4 (1)	34	3 (2)		13.6 %	0.60 [0.07, 1.12]
McClellan 2004	12	21.9 (9.4)	9	17.8 (7.4)		4.9 %	0.46 [-0.42, 1.33]
Salbach 2004a	44	249 (136)	47	209 (132)		22.2 %	0.30 [-0.12, 0.71]
Subtotal (95% CI)	**101**		**109**			**49.4 %**	**0.48 [0.20, 0.75]**
Heterogeneity: Chi^2 = 3.12, df = 4 (P = 0.54); I^2 =0.0%							
Test for overall effect: Z = 3.36 (P = 0.00077)							
3 Single task training							
de S ze 2001	10	70.3 (24.2)	10	70.4 (21.7)		4.9 %	0.00 [-0.88, 0.87]
Dean 1997	10	33.8 (18.6)	8	29.4 (33.9)		4.4 %	0.16 [-0.77, 1.09]
Howe 2005	15	-3.3 (3.7)	15	-2.6 (1.2)		7.3 %	-0.25 [-0.97, 0.47]
Subtotal (95% CI)	**35**		**33**			**16.7 %**	**-0.07 [-0.55, 0.41]**
Heterogeneity: Chi^2 = 0.49, df = 2 (P = 0.78); I^2 =0.0%							
Test for overall effect: Z = 0.28 (P = 0.78)							
Total (95% CI)	**207**		**209**			**100.0 %**	**0.26 [0.06, 0.45]**
Heterogeneity: Chi^2 = 8.67, df = 9 (P = 0.47); I^2 =0.0%							
Test for overall effect: Z = 2.58 (P = 0.0098)							
Test for subgroup differences: Chi^2 = 5.05, df = 2 (P = 0.08), I^2 =60%							

Analysis 7.1. Comparison 7 Global motor function, Outcome 1 Global motor function scales.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 7 Global motor function

Outcome: 1 Global motor function scales

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
Langhammer 2000	29	37 (12)	24	33 (15)		38.3 %	0.29 [-0.25, 0.84]
Van Vliet 2005	42	7.85 (3.17)	43	6.69 (3.52)		61.7 %	0.34 [-0.09, 0.77]
Total (95% CI)	**71**		**67**			**100.0 %**	**0.32 [-0.01, 0.66]**

Heterogeneity: Chi^2 = 0.02, df = 1 (P = 0.89); I^2 =0.0%

Test for overall effect: Z = 1.89 (P = 0.059)

Test for subgroup differences: Not applicable

Analysis 8.1. Comparison 8 Secondary outcomes, Outcome 1 Activities of daily living function.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 8 Secondary outcomes

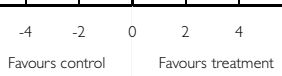
Outcome: 1 Activities of daily living function

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
de S ze 2001	10	99.4 (10.8)	10	101.7 (14.3)		6.3 %	-0.17 [-1.05, 0.70]
Kwakkel 1999	54	16.96 (3.66)	34	14 (5)		25.1 %	0.69 [0.25, 1.14]
Langhammer 2000	29	83 (25)	24	72 (34)		16.4 %	0.37 [-0.18, 0.91]
Salbach 2004a	40	93.4 (18.7)	39	90.2 (12.6)		25.0 %	0.20 [-0.24, 0.64]
Van Vliet 2005	42	16.02 (3.9)	43	15.78 (4.4)		27.1 %	0.06 [-0.37, 0.48]
Total (95% CI)	**175**		**150**			**100.0 %**	**0.29 [0.07, 0.51]**

Heterogeneity: Chi^2 = 5.69, df = 4 (P = 0.22); I^2 =30%

Test for overall effect: Z = 2.56 (P = 0.010)

Test for subgroup differences: Not applicable



Analysis 8.2. Comparison 8 Secondary outcomes, Outcome 2 Upper limb impairment.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 8 Secondary outcomes

Outcome: 2 Upper limb impairment

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
Langhammer 2000	29	65 (21)	24	58 (23)		28.4 %	0.31 [-0.23, 0.86]
Salbach 2004b	47	76 (30)	44	74 (34)		49.7 %	0.06 [-0.35, 0.47]
Winstein 2004	20	36.2 (19.3)	20	34.57 (24.4)		21.9 %	0.07 [-0.55, 0.69]
Total (95% CI)	**96**		**88**			**100.0 %**	**0.14 [-0.15, 0.43]**

Heterogeneity: $Chi^2 = 0.58$, df = 2 (P = 0.75); $I^2 = 0.0\%$

Test for overall effect: Z = 0.92 (P = 0.36)

Test for subgroup differences: Not applicable

Analysis 8.3. Comparison 8 Secondary outcomes, Outcome 3 Lower limb impairment.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 8 Secondary outcomes

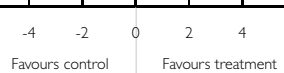
Outcome: 3 Lower limb impairment

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
de S ze 2001	10	70.3 (24.2)	10	70.4 (21.7)		27.7 %	0.00 [-0.88, 0.87]
Langhammer 2000	29	17 (5)	24	16 (6)		72.3 %	0.18 [-0.36, 0.72]
Total (95% CI)	**39**		**34**			**100.0 %**	**0.13 [-0.33, 0.59]**

Heterogeneity: $Chi^2 = 0.12$, df = 1 (P = 0.73); $I^2 = 0.0\%$

Test for overall effect: Z = 0.55 (P = 0.58)

Test for subgroup differences: Not applicable



Analysis 8.4. Comparison 8 Secondary outcomes, Outcome 4 Quality of life/health status.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 8 Secondary outcomes

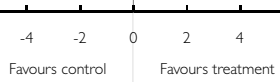
Outcome: 4 Quality of life/health status

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
Barreca 2004	21	-17.76 (5.03)	19	-17.16 (4.34)		27.1 %	-0.12 [-0.75, 0.50]
Kwakkel 1999	29	-9.8 (8.1)	26	-11.6 (7.9)		37.1 %	0.22 [-0.31, 0.75]
Langhammer 2000	29	-22 (18)	24	-24 (21)		35.7 %	0.10 [-0.44, 0.64]
Total (95% CI)	**79**		**69**			**100.0 %**	**0.08 [-0.24, 0.41]**

Heterogeneity: $Chi^2 = 0.70$, df = 2 (P = 0.71); $I^2 = 0.0\%$

Test for overall effect: Z = 0.51 (P = 0.61)

Test for subgroup differences: Not applicable



Analysis 9.1. Comparison 9 Sensitivity analyses, Outcome 1 Allocation concealment.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 9 Sensitivity analyses

Outcome: 1 Allocation concealment

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 Adequate							
Blennerhassett 2004b	15	404 (101)	15	288 (124)		5.3 %	1.00 [0.23, 1.76]
Dean 2000	5	84 (46.7)	4	81.5 (47.2)		1.8 %	0.05 [-1.27, 1.36]
Howe 2005	15	-1.9 (0.8)	18	-2.1 (0.7)		6.6 %	0.26 [-0.43, 0.95]
Kwakkel 1999a	25	4 (1)	34	3 (2)		11.2 %	0.60 [0.07, 1.12]
McClellan 2004	12	21.9 (9.4)	9	17.8 (7.4)		4.0 %	0.46 [-0.42, 1.33]
Salbach 2004a	44	249 (136)	47	209 (132)		18.2 %	0.30 [-0.12, 0.71]
Van Vliet 2005	42	7.85 (3.17)	43	6.69 (3.52)		17.0 %	0.34 [-0.09, 0.77]
Winstein 2004	20	9.58 (5.7)	20	9.47 (6.3)		8.1 %	0.02 [-0.60, 0.64]
Subtotal (95% CI)	**178**		**190**			**72.1 %**	**0.37 [0.17, 0.58]**
Heterogeneity: Chi^2 = 5.03, df = 7 (P = 0.66); I^2 =0.0%							
Test for overall effect: Z = 3.53 (P = 0.00042)							
2 Inadequate/unclear							
de S ze 2001	10	2.4 (1.6)	10	2 (0.8)		4.0 %	0.30 [-0.58, 1.19]
Dean 1997	10	1200 (94.9)	9	1080 (90)		3.1 %	1.24 [0.23, 2.24]
Langhammer 2000	29	37 (12)	24	33 (15)		10.5 %	0.29 [-0.25, 0.84]
Turton 1990	12	13.83 (6)	10	12.25 (7.2)		4.4 %	0.23 [-0.61, 1.07]
Yen 2005	13	-2.57 (0.93)	17	-3.06 (1.54)		5.9 %	0.36 [-0.37, 1.09]
Subtotal (95% CI)	**74**		**70**			**27.9 %**	**0.40 [0.07, 0.74]**
Heterogeneity: Chi^2 = 3.03, df = 4 (P = 0.55); I^2 =0.0%							
Test for overall effect: Z = 2.37 (P = 0.018)							
Total (95% CI)	**252**		**260**			**100.0 %**	**0.38 [0.21, 0.56]**
Heterogeneity: Chi^2 = 8.09, df = 12 (P = 0.78); I^2 =0.0%							
Test for overall effect: Z = 4.25 (P = 0.000022)							
Test for subgroup differences: Chi^2 = 0.02, df = 1 (P = 0.88), I^2 =0.0%							

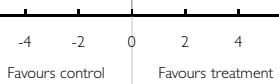
Analysis 9.2. Comparison 9 Sensitivity analyses, Outcome 2 Comparison groups.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 9 Sensitivity analyses

Outcome: 2 Comparison groups

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 Usual care							
de S ze 2001	10	2.4 (1.6)	10	2 (0.8)		4.0 %	0.30 [-0.58, 1.19]
Howe 2005	15	-1.9 (0.8)	18	-2.1 (0.7)		6.6 %	0.26 [-0.43, 0.95]
Langhammer 2000	29	37 (12)	24	33 (15)		10.5 %	0.29 [-0.25, 0.84]
Turton 1990	12	13.83 (6)	10	12.25 (7.2)		4.4 %	0.23 [-0.61, 1.07]
Van Vliet 2005	42	7.85 (3.17)	43	6.69 (3.52)		17.0 %	0.34 [-0.09, 0.77]
Winstein 2004	20	9.58 (5.7)	20	9.47 (6.3)		8.1 %	0.02 [-0.60, 0.64]
Yen 2005	13	-2.57 (0.93)	17	-3.06 (1.54)		5.9 %	0.36 [-0.37, 1.09]
Subtotal (95% CI)	**141**		**142**			**56.4 %**	**0.27 [0.03, 0.50]**
Heterogeneity: Chi² = 0.83, df = 6 (P = 0.99); I² =0.0%							
Test for overall effect: Z = 2.24 (P = 0.025)							
2 Attention control							
Blennerhassett 2004b	15	404 (101)	15	288 (124)		5.3 %	1.00 [0.23, 1.76]
Dean 1997	10	1200 (94.9)	9	1080 (90)		3.1 %	1.24 [0.23, 2.24]
Dean 2000	5	84 (46.7)	4	81.5 (47.2)		1.8 %	0.05 [-1.27, 1.36]
Kwakkel 1999a	25	4 (1)	34	3 (2)		11.2 %	0.60 [0.07, 1.12]
McClellan 2004	12	21.9 (9.4)	9	17.8 (7.4)		4.0 %	0.46 [-0.42, 1.33]
Salbach 2004a	44	249 (136)	47	209 (132)		18.2 %	0.30 [-0.12, 0.71]
Subtotal (95% CI)	**111**		**118**			**43.6 %**	**0.53 [0.26, 0.80]**
Heterogeneity: Chi² = 5.18, df = 5 (P = 0.39); I² =4%							
Test for overall effect: Z = 3.89 (P = 0.00010)							
Total (95% CI)	**252**		**260**			**100.0 %**	**0.38 [0.21, 0.56]**
Heterogeneity: Chi² = 8.09, df = 12 (P = 0.78); I² =0.0%							
Test for overall effect: Z = 4.25 (P = 0.000022)							
Test for subgroup differences: Chi² = 2.08, df = 1 (P = 0.15), I² =52%							



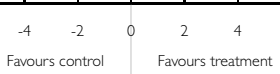
Analysis 9.3. Comparison 9 Sensitivity analyses, Outcome 3 Equivalence of therapy time.

Review: Repetitive task training for improving functional ability after stroke

Comparison: 9 Sensitivity analyses

Outcome: 3 Equivalence of therapy time

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Std. Mean Difference IV,Fixed,95% CI	Weight	Std. Mean Difference IV,Fixed,95% CI
1 Additional therapy time							
Turton 1990	12	13.83 (6)	10	12.25 (7.2)		4.4 %	0.23 [-0.61, 1.07]
Winstein 2004	20	9.58 (5.7)	20	9.47 (6.3)		8.1 %	0.02 [-0.60, 0.64]
Subtotal (95% CI)	**32**		**30**			**12.5 %**	**0.09 [-0.41, 0.59]**
Heterogeneity: Chi² = 0.16, df = 1 (P = 0.69); I² =0.0%							
Test for overall effect: Z = 0.36 (P = 0.72)							
2 Equivalent therapy time							
Blennerhassett 2004b	15	404 (101)	15	288 (124)		5.3 %	1.00 [0.23, 1.76]
de S ze 2001	10	2.4 (1.6)	10	2 (0.8)		4.0 %	0.30 [-0.58, 1.19]
Dean 1997	10	1200 (94.9)	9	1080 (90)		3.1 %	1.24 [0.23, 2.24]
Dean 2000	5	84 (46.7)	4	81.5 (47.2)		1.8 %	0.05 [-1.27, 1.36]
Howe 2005	15	-1.9 (0.8)	18	-2.1 (0.7)		6.6 %	0.26 [-0.43, 0.95]
Kwakkel 1999a	25	4 (1)	34	3 (2)		11.2 %	0.60 [0.07, 1.12]
Langhammer 2000	29	37 (12)	24	33 (15)		10.5 %	0.29 [-0.25, 0.84]
McClellan 2004	12	21.9 (9.4)	9	17.8 (7.4)		4.0 %	0.46 [-0.42, 1.33]
Salbach 2004a	44	249 (136)	47	209 (132)		18.2 %	0.30 [-0.12, 0.71]
Van Vliet 2005	42	7.85 (3.17)	43	6.69 (3.52)		17.0 %	0.34 [-0.09, 0.77]
Yen 2005	13	-2.57 (0.93)	17	-3.06 (1.54)		5.9 %	0.36 [-0.37, 1.09]
Subtotal (95% CI)	**220**		**230**			**87.5 %**	**0.42 [0.23, 0.61]**
Heterogeneity: Chi² = 6.46, df = 10 (P = 0.78); I² =0.0%							
Test for overall effect: Z = 4.40 (P = 0.000011)							
Total (95% CI)	**252**		**260**			**100.0 %**	**0.38 [0.21, 0.56]**
Heterogeneity: Chi² = 8.09, df = 12 (P = 0.78); I² =0.0%							
Test for overall effect: Z = 4.25 (P = 0.000022)							
Test for subgroup differences: Chi² = 1.47, df = 1 (P = 0.22), I² =32%							



ADDITIONAL TABLES

Table 1. Criteria for subgroup and sensitivity analyses

STUDY	Task practice dose	Time since stroke	Type of intervention	Practice intensity	Allocation conceal	Comparison group	Therapy equivalence	Small trials
	1 = 20 hours or less 2 = more than 20 hours	1 = 1 to 14 days 2 = 15 days to 6 months 3 = more than 6 months	1 = whole therapy 2 = mixed task 3 = single task	1 = 1 to 4 weeks or less 2 = more than 4 weeks	A = adequate B = inadequate/ unclear	AC = attention control UC = usual care	EQ = equivalent therapy time ADD = additional therapy time	1 = less than 25 participants 2 = 25 or more participants
Blennerhassett 2004	1	2	2	1	A	AC	EQ	2
Dean 1997	1	3	3	1	B	AC	EQ	1
Dean 2000	1	3	2	1	A	AC	EQ	1
De Sèze 2001	1	2	3	1	B	UC	EQ	2
Howe 2005	1	2	3	1	A	UC	EQ	2
Kwakkel 1999	2	1	2	2	A	AC	EQ	2
Langhammer 2000	1	1	1	1	B	UC	EQ	2
McClellan 2004	2	3	2	2	A	AC	EQ	2
Salbach 2004	1	3	2	2	A	AC	EQ	2
Turton 1990	2	2	2	2	B	UC	ADD	1
Van Vliet 2005	1	1	1	1	A	UC	EQ	2
Winstein 2004	1	1	2	1	A	UC	ADD	2
Yen 2005	2	3	2	1	B	UC	EQ	2

Table 2. Outcome measures used from the included trials

Author and year	Global function	Lower limb function	Balance/sit to stand	Upper limb function	Hand function	ADL function	Impairment	QOL, health status	Adverse events
Barreca 2004			Number able to stand					Dartmouth COOP	Falls
Blennerhassett 2004		6 Minute Walk Test, Step Test	Timed Up & Go Test	Motor Assessment Scale arm	Motor Assessment Scale hand				
Dean 1997		10 Metre Walk Speed	Reaching distance						
Dean 2000		6 Minute Walk Test, 10 Metre Walk Speed, Step Test							
De Seze 2001		Functional Ambulation Classification	Sitting and Standing Equilibrium Index			Functional Independence Measure	Trunk Control Test		
Howe 2005			Lateral reach - time, sit to stand - time						
Kwakkel 1999		Functional Ambulation Classification		Action Research Arm Test		Barthel Index		Nottingham Health Profile	
Langhammer 2000	Motor Assessment Scale	Motor Assessment Scale walking, Sodring Motor Evaluation Scale trunk, balance and	Motor Assessment Scale balanced sitting, Motor Assessment Scale sit to stand	Motor Assessment Scale arm	Motor Assessment Scale hand	Barthel Index	Sodring Motor Evaluation Scale leg subscale, Sodring Motor Evalu-	Nottingham Health Profile	

Table 2. Outcome measures used from the included trials (*Continued*)

		gait					ation Scale arm subscale		
McClellan 2004		Motor Assessment Scale walking	Functional Reach						
Salbach 2004, Higgins 2006		6 Minute Walk Test, 5 Metre Walk Speed	Timed Up & Go Test, Berg Balance	Box & Block Test	9 Hole Peg Test	Barthel Index			
Turton 1990				Southern Motor Group Assessment - upper extremity	10 Hole Peg Test				
Van Vliet 2005	Rivermead Motor Assessment Gross Function	Rivermead Motor Assessment leg and trunk, 6 Minute Walk Test, Motor Assessment Scale walking, Rivermead Motor Assessment leg and trunk	Motor Assessment Scale balanced sitting, Motor Assessment Scale sit to stand	Motor Assessment Scale arm	Motor Assessment Scale hand	Barthel Index			
Winstein 2004				Functional Test of the Hemiparetic Upper Extremity			Fugl Meyer Assessment		
Yen 2005				Wolf Motor Function Test					

APPENDICES

Appendix 1. MEDLINE search strategies

1 cerebrovascular disorders/ or exp basal ganglia cerebrovascular disease/ or exp brain ischemia/ or exp carotid artery diseases/ or cerebrovascular accident/ or exp brain infarction/ or exp cerebrovascular trauma/ or exp hypoxia-ischemia, brain/ or exp intracranial arterial diseases/ or intracranial arteriovenous malformations/ or exp "Intracranial Embolism and Thrombosis"/ or exp intracranial hemorrhages/ or vasospasm, intracranial/ or vertebral artery dissection/
2 (stroke or poststroke or post-stroke or cerebrovasc$ or brain vasc$ or cerebral vasc$ or cva$ or apoplex$ or SAH).tw.
3 ((brain$ or cerebr$ or cerebell$ or intracran$ or intracerebral) adj5 (isch?emi$ or infarct$ or thrombo$ or emboli$ or occlus$)).tw.
4 ((brain$ or cerebr$ or cerebell$ or intracerebral or intracranial or subarachnoid) adj5 (haemorrhage$ or hemorrhage$ or haematoma$ or hematoma$ or bleed$)).tw.
5 hemiplegia/ or exp paresis/
6 (hemipleg$ or hemipar$ or paresis or paretic).tw.
7 or/1-6
8 *cerebrovascular disorders/rh or exp *basal ganglia cerebrovascular disease/rh or exp *brain ischemia/rh or exp *carotid artery diseases/rh or *cerebrovascular accident/rh or exp *brain infarction/rh or exp *cerebrovascular trauma/rh or exp *hypoxia-ischemia, brain/rh or exp *intracranial arterial diseases/rh or *intracranial arteriovenous malformations/rh or exp *"Intracranial Embolism and Thrombosis"/rh or exp *intracranial hemorrhages/rh or *vasospasm, intracranial/rh or *vertebral artery dissection/rh
9 *hemiplegia/rh or exp *paresis/rh
10 exp *gait Disorders, neurologic/rh or *motor skills disorders/rh
11 8 or 9 or 10
12 rehabilitation/ or "activities of daily living"/ or exercise therapy/ or occupational therapy/
13 Physical Therapy Modalities/
14 Exercise Movement Techniques/ or walking/
15 Robotics/
16 exp Psychomotor Performance/
17 movement/ or gait/ or exp locomotion/ or exp motor activity/
18 "Range of Motion, Articular"/ or "Task Performance and Analysis"/ or "Practice (Psychology)"/
19 "Recovery of Function"/
20 ((motor or movement$ or task$ or skill$ or performance) adj5 (repetit$ or repeat$ or train$ or re?train$ or learn$ or re?learn$ or practic$ or practis$ or rehears$ or rehers$)).tw.
21 ((motor or movement$ or task$ or skill$ or performance) adj5 (schedule$ or intervention or therap$ or program$ or regim$ or protocol$)).tw.
22 (functional adj5 (task$ or movement)).tw.
23 or/12-22
24 7 and 23
25 11 or 24
26 Randomized Controlled Trials/
27 random allocation/
28 Controlled Clinical Trials/
29 control groups/
30 clinical trials/
31 double-blind method/
32 single-blind method/
33 Placebos/
34 placebo effect/
35 cross-over studies/
36 Therapies, Investigational/
37 Research Design/
38 evaluation studies/
39 randomized controlled trial.pt.
40 controlled clinical trial.pt.

41 clinical trial.pt.
42 evaluation studies.pt.
43 random$.tw.
44 (controlled adj5 (trial$ or stud$)).tw.
45 (clinical$ adj5 trial$).tw.
46 ((control or treatment or experiment$ or intervention) adj5 (group$ or subject$ or patient$)).tw.
47 (quasi-random$ or quasi random$ or pseudo-random$ or pseudo random$).tw.
48 ((control or experiment$ or conservative) adj5 (treatment or therapy or procedure or manage$)).tw.
49 ((singl$ or doubl$ or tripl$ or trebl$) adj5 (blind$ or mask$)).tw.
50 (coin adj5 (flip or flipped or toss$)).tw.
51 latin square.tw.
52 versus.tw.
53 (cross-over or cross over or crossover).tw.
54 placebo$.tw.
55 sham.tw.
56 (assign$ or alternate or allocat$ or counterbalance$ or multiple baseline).tw.
57 controls.tw.
58 (treatment$ adj6 order).tw.
59 or/26-58
60 25 and 59
61 limit 60 to humans

We conducted an additional search (given below in the MEDLINE Ovid format) without limits of study type or client group, or both, to check for trials incorrectly indexed, and to trace trials of RTT in other client groups for citation tracking.

1 *hemiplegia/rh or exp *paresis/rh
2 exp *gait Disorders, neurologic/rh or *motor skills disorders/rh
3 1 or 2
4 Physical Therapy Modalities/
5 Exercise Movement Techniques/ or exercise therapy/ or walking/
6 Robotics/
7 rehabilitation/ or “activities of daily living”/ or occupational therapy/
8 exp Psychomotor Performance/
9 “Task Performance and Analysis”/ or “Practice (Psychology)”/
10 ((motor or movement$ or task$ or skill$ or performance) adj5 (repetit$ or repeat$ or train$ or re?train$ or practic$ or practis$ or rehears$ or rehers$)).tw.
11 (functional adj5 (task$ or movement)).tw.
12 or/4-11
13 movement/ or gait/ or exp locomotion/ or exp motor activity/
14 “Recovery of Function”/
15 13 and 14
16 3 and (12 or 15)

WHAT’S NEW

Last assessed as up-to-date: 10 April 2007.

Date	Event	Description
1 October 2008	Amended	Converted to new review format.

CONTRIBUTIONS OF AUTHORS

Beverley French co-ordinated the review process and managed searching and main data input. Beverley French, Lois Thomas, Michael Leathley, and Joanna McAdam undertook data filtration, extraction, appraisal and analysis. Joanna McAdam was responsible for the administration of the review process. Chris Sutton provided statistical expertise. Peter Langhorne, Christopher Price, Anne Forster, Caroline Watkins and Andrew Walker directed the review focus and quality, and undertook critical reading of outputs.

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- No sources of support supplied

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INDEX TERMS

Medical Subject Headings (MeSH)

*Activities of Daily Living; *Physical Therapy Modalities; *Recovery of Function; Extremities; Motor Activity; Randomized Controlled Trials as Topic; Stroke [*rehabilitation]; Task Performance and Analysis; Walking

MeSH check words

Humans