Interventions for improving mobility after hip fracture surgery in adults (Review)

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[Intervention Review]

Interventions for improving mobility after hip fracture surgery in adults

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ABSTRACT

Background

Hip fracture mainly occurs in older people. Strategies to improve mobility include gait retraining, various forms of exercise and muscle stimulation.

Objectives

To evaluate the effects of different interventions for improving mobility after hip fracture surgery in adults.

Search strategy

We searched the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register, the Cochrane Central Register of Controlled Trials, MEDLINE and other databases, and reference lists of articles, up to April 2010.

Selection criteria

All randomised or quasi-randomised trials comparing different mobilisation strategies after hip fracture surgery.

Data collection and analysis

The authors independently selected trials, assessed risk of bias and extracted data. There was no data pooling.

Main results

The 19 included trials (involving 1589 older adults) were small, often with methodological flaws. Just two pairs of trials tested similar interventions.

Twelve trials evaluated mobilisation strategies started soon after hip fracture surgery. Single trials found improved mobility from, respectively, a two-week weight-bearing programme, a quadriceps muscle strengthening exercise programme and electrical stimulation aimed at alleviating pain. Single trials found no significant improvement in mobility from, respectively, a treadmill gait retraining programme, 12 weeks of resistance training, and 16 weeks of weight-bearing exercise. One trial testing ambulation started within 48 hours of surgery found contradictory results. One historic trial found no significant difference in unfavourable outcomes for weight bearing started at two versus 12 weeks. Of two trials evaluating more intensive physiotherapy regimens, one found no difference in

recovery, the other reported a higher level of drop-out in the more intensive group. Two trials tested electrical stimulation of the quadriceps: one found no benefit and poor tolerance of the intervention; the other found improved mobility and good tolerance.

Seven trials evaluated strategies started after hospital discharge. Started soon after discharge, two trials found improved outcome after 12 weeks of intensive physical training and a home-based physical therapy programme respectively. Begun after completion of standard physical therapy, one trial found improved outcome after six months of intensive physical training, one trial found increased activity levels from a one year exercise programme, and one trial found no significant effects of home-based resistance or aerobic training. One trial found improved outcome after home-based exercises started around 22 weeks from injury. One trial found home-based weight-bearing exercises starting at seven months produced no significant improvement in mobility.

Authors' conclusions

There is insufficient evidence from randomised trials to establish the best strategies for enhancing mobility after hip fracture surgery.

PLAIN LANGUAGE SUMMARY

Interventions aimed at improving and restoring mobility after hip fracture surgery in adults

The aim of care after surgery for hip fracture is to get people safely back on their feet and walking again. Initially, people may be asked to rest in bed and restrict weight bearing. Then various strategies to improve mobility, including gait retraining and exercise programmes, are used during hospital stay and often after discharge from hospital.

This review includes evidence from 19 trials involving 1589 participants, generally aged over 65 years. Many of the trials had weak methods, including inadequate follow-up. There was no pooling of data because no two trials were sufficiently alike.

Twelve trials evaluated interventions started soon after hip fracture surgery. Single trials found improved mobility from, respectively, a two-week weight-bearing programme, a quadriceps muscle strengthening exercise programme and electrical stimulation aimed at alleviating pain. Single trials found no significant improvement in mobility from, respectively, a treadmill gait retraining programme, 12 weeks of resistance training, and 16 weeks of weight-bearing exercise. One trial testing ambulation started within 48 hours of surgery found contradictory results. One historic trial found no significant difference in unfavourable outcomes for weight bearing started at two versus 12 weeks. Of two trials evaluating more intensive physiotherapy regimens, one found no difference in recovery, the other reported a higher level of drop-out in the more intensive group. Two trials tested electrical stimulation of the quadriceps: one found no benefit and poor tolerance of the intervention; the other found improved mobility and good tolerance.

Seven trials evaluated interventions started after hospital discharge. Started soon after discharge, two trials found improved outcome after 12 weeks of intensive physical training and a home-based physical therapy programme respectively. Begun after completion of standard physical therapy, one trial found improved outcome after six months of intensive physical training, one trial found increased activity levels from a one year exercise programme, and one trial found no significant effects of home-based resistance or aerobic training. One trial found improved outcome after home-based exercises started around 22 weeks from injury. One trial found home-based weight-bearing exercises starting at seven months produced no significant improvement in mobility.

In summary, the review found there was not enough evidence to determine which are the best strategies, started in hospital or after discharge from hospital, for helping people walk and continue walking after hip fracture surgery.

BACKGROUND

Description of the condition

Hip fractures, which are fractures of the proximal femur, can be subdivided into intracapsular fractures (those occurring proximal to the attachment of the hip joint capsule to the femur) and extracapsular (those occurring distal to the hip joint capsule). The

majority of hip fractures occur in older people with an average age of around 80 years. Females predominate over males by about four to one and the injury is usually the result of a simple fall. This reflects the loss of skeletal strength from osteoporosis. As well as osteoporosis, people suffering a hip fracture frequently have other medical and physical problems associated with ageing, including impaired mobility.

Currently, the majority of hip fractures are treated surgically, which enables earlier mobilisation of the patient and avoids some of the complications of prolonged recumbency and immobilisation. Surgery entails either internal fixation where the fracture is fixed using various implants and thereby retaining the femoral head, or by replacing the femoral head with a prosthesis.

Although surgery is generally successful, few people recover fully from their hip fracture.

Between 5% to 10% of patients die within one month of their hip fracture. About a third of patients will have died by one year after fracture, compared with an expected annual mortality of about 10% in this age group (Roche 2005). Most survivors fail to regain their former levels of mobility and activity, and many become more dependent and around 10% of survivors will be unable to return to their previous residence (Magaziner 2000; Parker 2006).

Description of the intervention

A variety of post-operative care programmes following surgery for hip fractures have been employed. In the early stages, these include resting the patient in bed ('bed rest') and restricted weight bearing. Mobilisation is a major component of post-operative care and rehabilitation. Various mobilisation strategies are in use. These aim to get people out of bed, back on their feet, weight-bearing, moving and walking. Other strategies for mobilisation relate to the nature of the physiotherapy or exercise regimens used. These include mobilisation interventions, such as exercise, training and muscle stimulation, which aim to minimise impairments (such as reduced strength) and improve the physical performance of walking.

This review continues to focus on mobilisation strategies. Thus trials testing interventions, including multi-component interventions, aimed at enhancing activities of daily living and other aspects of functioning rather than specifically mobilisation are not included here. Other aspects of rehabilitation after hip fracture such as single therapy programmes specifically designed to improve physical and psychosocial functioning (Crotty 2010), multidisciplinary care programmes (Handoll 2009) and nutritional supplementation (Avenell 2006) are considered within separate Cochrane reviews.

How the intervention might work

The timing and extent of weight bearing form part of any mobilisation strategy after hip fracture surgery. Other components of mobilisation strategies generally involve various forms of exercise regimens; again the extent and timing of these will vary. The aim of these is to improve the patient's walking ability and associated functioning. The possibility of a refracture and other complications usually affects the decisions as to when to allow restricted or full weight bearing on the injured hip and the subsequent pace and stages of physical rehabilitation. In particular, the patient is at risk of several complications of fracture healing following internal fixation of a hip fracture. For example, the implant may fail to hold the fracture or 'cut-out' of the bone (penetration of the implant from the proximal femur either into the hip joint or external to the femur) causing pain and impaired mobility. This may require revision surgery to re-fix the fracture, or replace the femoral head with an arthroplasty. Other complications of fracture healing that may occur are non-union of the fracture (that is failure of the fracture to heal) and avascular necrosis of the femoral head (also termed segmental collapse or aseptic necrosis).

Different considerations feature in the later stages of rehabilitation, which mainly occurs after discharge from hospital and in the community or residential care setting. As before, mobilisation strategies aim to improve the patient's walking ability and associated functioning. However, there may be a greater emphasis on independent and confident ambulation, with the correct use of ambulatory aids and specific interventions, such as muscle strengthening exercises, aimed at minimising or correcting impairments; for example, various gait problems that often manifest as a limp.

Why it is important to do this review

Worldwide, an estimated 1.26 million hip fractures occurred in adults in 1990, with predictions of numbers rising to between 7.3 and 21.3 million by the year 2050; the steepest increases being expected in Asia (Gullberg 1997). Some more recent studies have revealed and predicted some levelling off of the rates of hip fracture in some countries (Marks 2010). This trend, which was not found in males, may partly reflect the impact of the pharmacological management of osteoporosis (Fisher 2009). However, given the increasing number of older people worldwide, the total numbers of hip fracture cases and their economic consequences are likely to rise substantively (Konnopka 2009). This together with the generally unfavourable outcome in survivors, many of whom end up more dependent and move into residential care, means that the burden on society from hip fractures is immense and increasing. Improving mobility outcomes is key to relieving the burden on the individuals, their carers and society. The previous version of this review noted the insufficiency of the evidence to inform practice, but it also located ongoing trials that potentially could help address this deficiency (Handoll 2007). This update continues the systematic review of the evidence on mobilisation strategies for these fractures.

OBJECTIVES

To evaluate the effects of different interventions and strategies aimed at improving mobility and physical functioning after hip fracture surgery in adults.

We have grouped trials according to the basic stage in the rehabilitation process when the trial intervention(s) commenced: either as an inpatient (early post-operative rehabilitation) or following discharge from inpatient care (continuation or community rehabilitation) after surgery for a hip fracture. Some further grouping of the post-discharge trials according to the stage in the rehabilitation process (e.g. post 'standard' rehabilitation) was also undertaken.

We considered comparisons between either a) the provision of any specific mobilisation strategy or programme and non-provision or b) different mobilisation strategies or programmes for people after surgery for a hip fracture.

METHODS

Criteria for considering studies for this review

Types of studies

All randomised controlled trials comparing different post-operative mobilisation strategies or programmes after surgery to repair an acute hip fracture. Quasi-randomised trials (for example, allocation by alternation or date of birth) and trials in which the treatment allocation was inadequately concealed were considered for inclusion.

Types of participants

Skeletally mature patients treated for a hip fracture at any stage during rehabilitation. Trials testing interventions started after the generally perceived recovery of around one year were excluded.

Types of interventions

Post-operative care programmes such as immediate or delayed weight bearing after surgery, and any other mobilisation strategies, such as exercises, physical training and muscle stimulation, used at various stages in rehabilitation, which aim to improve walking and minimise functional impairments. Excluded were trials testing interventions that did not aim specifically to improve mobility, and those testing care programmes, management strategies and other multi-component interventions that were not solely aimed at mobilisation. From this update (2010), trials testing mobilisation strategies with nutrition as a co-intervention are now included.

Types of outcome measures

While the outcomes sought remain basically unchanged from previous versions (*see* Appendix 1), this section has been restructured to present primary and secondary outcomes. As before the main focus of the interventions tested in this review is to safely restore or enhance mobility and physical functioning. Such interventions and outcome assessment can apply to the whole rehabilitation period.

Primary outcomes

1. Mobility
   i) broad mobility measures (e.g. scales seeking to measure a number of aspects of mobility)
   ii) walking
      a) self-reported measures
      b) observed gait measures
      c) use of walking aids/need for assistance
   iii) balance while standing, reaching and stepping
      a) self-reported measures
      b) observed balance measures
2. Adverse effects
   i) surgical complications of fixation within the follow-up period of the study
      a) reoperation
      b) non-union of the fracture (the definition of non-union is that used within each individual study, and this outcome includes early re-displacement of the fracture)
      c) avascular necrosis
      d) other complications (e.g. thromboembolic complications (deep vein thrombosis or pulmonary embolism))
   ii) readmission
   iii) mortality
   iv) pain (persistent pain at the final follow-up assessment)
   v) falls

Secondary outcomes

1. General functioning
   i) return to living at home
   ii) health related quality of life measures
2. Muscle strength
3. Patient satisfaction
   i) acceptability of interventions
   ii) adherence
4. Resources (resources considered will depend on the context and stage of rehabilitation)
   i) length of hospital stay (in days)
   ii) number of physiotherapy sessions
   iii) number of outpatient attendances
   iv) need for special care

Search methods for identification of studies

Electronic searches

For this update, we searched the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register (1st April 2010), the Cochrane Central Register of Controlled Trials (in *The Cochrane Library* 2010, Issue 3), MEDLINE (1966 to March week 4 2010), EMBASE (1988 to 2010 week 12), CINAHL (1982 to September week 4 2006), and PEDro - The Physiotherapy Evidence Database up to September 2010. *See* Appendix 2 for the search strategies for CENTRAL, MEDLINE, EMBASE and CINAHL. The first two sections of the optimal MEDLINE search strategy for randomised trials (Higgins 2005) were combined with the subject specific search shown in Appendix 2. No language or publication restrictions were applied.

In September 2010, we searched the WHO International Clinical Trials Registry Platform Search Portal, Current Controlled Trials, and the UK National Research Register (NRR) Archive to identify ongoing and recently completed trials.

An account of the search strategies in previous versions is given in Handoll 2007.

Searching other resources

We checked reference lists of articles and contacted trialists.

Data collection and analysis

Selection of studies

For this update, initial scrutiny of electronic database downloads was by HH. All three authors independently performed study selection from lists of potential trials provided by the Trials Search Co-ordinator of the Cochrane Bone, Joint and Muscle Trauma Group or HH; and subsequently from full reports where doubts remained. Trial selection was by consensus.

Data extraction and management

Trial information and data were independently extracted by at least two authors using a pre-piloted data extraction form. Differences were resolved by discussion. Data entry into Revman was by HH.

Assessment of risk of bias in included studies

Risk of bias was independently assessed, without masking of the source and authorship of the trial reports, by at least two authors for newly included trials, and by at least one author for trials that had been assessed in previous versions of the review. The assessment form was piloted using two trials. Between rater and between versions consistency in assessment was checked by HH at data entry. All differences were resolved by discussion. We used the tool outlined in the Cochrane Handbook for Systematic Reviews of Interventions (Higgins 2008). This tool incorporates assessment of randomisation (sequence generation and allocation concealment), blinding (of participants, treatment providers and outcome assessors), completeness of outcome data, selection of outcomes reported and other sources of bias. We considered subjective outcomes (mobility, functional outcomes, pain) and 'hard' outcomes (death, complications, readmission, re-operation) separately in our assessment of blinding and completeness of outcome data. We assessed two additional sources of bias: bias resulting from imbalances in key baseline characteristics (e.g. pre-injury mobility, mental test score, type of surgery); and performance bias such as that resulting from lack of comparability in the experience of care providers.

Additionally, we assessed five other aspects of trial design and reporting that would help us judge the applicability of the trial findings. The five aspects were: definition of the study population; description of the interventions; definition of primary outcome measures; length of follow-up; and assessment of compliance/adherence with interventions.

The 10 aspects of methodological quality assessed in previous versions of the review (before Issue 2, 2010) are shown in Appendix 3.

Measures of treatment effect

Risk ratios and 95% confidence intervals were calculated for dichotomous outcomes, and mean differences and 95% confidence intervals calculated for continuous outcomes. Final values rather than change scores were presented for continuous outcomes.

Unit of analysis issues

There were no cluster randomised trials and no trial reported the inclusion of people with bilateral hip fractures.

Dealing with missing data

We contacted trial authors to request missing data. Where possible we performed intention-to-treat analyses to include all people randomised. However, where drop-outs were identified, the actual denominators of participants contributing data at the relevant outcome assessment were used. We were alert to the potential mislabelling or non identification of standard errors and standard deviations. Unless missing standard deviations could be derived from confidence intervals or standard errors, we did not assume values in order to present these in the analyses.

Assessment of heterogeneity

We planned to assess heterogeneity by visual inspection of the forest plot (analysis) along with consideration of the chi² test for heterogeneity and the I^2 statistic (Higgins 2003).

Assessment of reporting biases

There were insufficient trials and data for the assessment of reporting biases. Our search of clinical trial registers has the potential to reduce the impact of publication bias, especially in the future. For individual trials, we checked all publications and trial registration details where available to assess consistency in outcome reporting.

Data synthesis

If pooling had been done, we planned that the results of comparable groups of trials would initially be pooled using the fixed-effect model and 95% confidence intervals. Where there was substantial heterogeneity between the results of individual trials, and when considered appropriate, the results of the random-effects model were to be viewed and presented instead of those from the fixed-effect model.

Subgroup analysis and investigation of heterogeneity

In the absence of data to enable meta-analysis, subgroup analyses were also not possible. Planned subgroup analyses were by gender, prefracture mobility, cognitive impairment, and for early mobilisation, type of fracture (intracapsular versus extracapsular fractures).

Sensitivity analysis

The absence of pooled data meant that sensitivity analysis, such as to examine the inclusion of trials with high or unclear risk of bias associated with a lack of allocation concealment, was not performed.

RESULTS

Description of studies

See: Characteristics of included studies; Characteristics of excluded studies; Characteristics of studies awaiting classification; Characteristics of ongoing studies.

Results of the search

On extension of the search for trials (the full search was completed in March 2010, but some ongoing trials were identified subsequently), 21 new studies were identified. Of these, two (Gorodetskyi 2007; Oldmeadow 2006) were included, nine (Carmeli 2006; Di Lorenzo 2007; Franczuk 2005a; Franczuk 2005b; Giangregorio 2005; Mendelsohn 2008; Ohsawa 2007; Olivetti 2007; Portegijs 2008; Stenvall 2007) were excluded, seven (INTERACTIVE; Jette; Kristensen; Martinsen; MASTER; Overgaard; ProMo) were placed in ongoing trials and two (Mangione; Orwig) await assessment. New reports resulted in the inclusion of four more trials (Braid 2008: formerly excluded study Braid 2001; Miller 2006 formerly awaiting assessment; Moseley 2009 former ongoing study Cameron 2004; Resnick 2007 former ongoing study Resnick 2002). Further reports, which were often retrospective trial registration entries, were identified also for studies that were categorised as either included or excluded in the previous version of this review (Handoll 2007)
In all, 19 trials are now included, seven trials are listed as ongoing, 22 trials are excluded and two are in the Studies awaiting classification.

Included studies

All 19 included trials were published as full reports in journals, their availability ranging from 1968 (Graham 1968) to 2009 (Moseley 2009). Details of study methods, participants, interventions and outcome measurement for the individual studies are provided in the Characteristics of included studies and summarised below.

Design

Eighteen trials were randomised clinical trials, although two of these (Graham 1968; Tsauo 2005) provided no details of their method of randomisation and thus use of quasi-randomised methods for sequence generation cannot be ruled out. Baker 1991 was a quasi-randomised trial using alternation for treatment allocation. Fourteen trials had two comparison groups, whereas two trials (Mangione 2005; Sherrington 2004) had three comparison groups and two trials (Miller 2006; Resnick 2007) had four comparison groups although only three of each trial are included in the review.

Sample sizes

The 19 included trials involved a total of 1589 patients. Study size ranged from 26 participants (Braid 2008) to 273 participants (Graham 1968).

Setting

The trials were conducted in eight different countries: Australia (7 trials); Denmark (1); Finland (1); Germany (1); Russia (1);

Taiwan (1); UK (4); and USA (3). Of the 12 trials examining primarily inpatient rehabilitation, 10 were single-centre and two were multi-centre. Participants of four trials testing post-discharge interventions were from single hospitals, whereas they were from several hospitals but still from the same region in the other three community or continuing rehabilitation trials. Some details of the timing of trial recruitment provided for 15 included trials (*see* the Characteristics of included studies) show Graham 1968 had the earliest start date (1961) and Gorodetskyi 2007, the most recent start date (2004).

Participants

The majority of participants in each trial were women (67% to 100% of trial population). Five trials (Baker 1991; Hauer 2002; Lamb 2002; Lauridsen 2002; Resnick 2007) only included women. The mean ages of trial participants ranged from 71 years (Gorodetskyi 2007) to 84 years (Lamb 2002; Moseley 2009); and was 80 or above in 11 trials. Thirteen trials set lower age limits, ranging from 50 years (Karumo 1977) to 75 years (Hauer 2002; Lamb 2002). Thirteen trials, including all seven post-discharge intervention trials, specially excluded people with various extents of cognitive impairment; judged according to various criteria and assessment instruments. Explicit exclusion criteria relating to previous and/or current immobility, and/or medical conditions affecting mobility were stated in all trials except Gorodetskyi 2007 and Tsauo 2005. Aside from Gorodetskyi 2007, which specified trochanteric fractures, Graham 1968 (displaced intracapsular fractures), and Karumo 1977 (femoral neck fractures), the included trials did not select on type of hip fracture. While not stated explicitly in some trials, it is very likely that all trial participants had surgery for a hip fracture except for three participants in Hauer 2002 who had elective hip surgery and 12 participants in Miller 2006 who were treated for another lower limb fracture.

Interventions

In 12 trials, the interventions under test were started in the early post-operative period; some continued after hospital discharge. The other seven trials were conducted in a community setting, after inpatient rehabilitation.

Early post-operative rehabilitation

Timing of mobilisation or weight bearing

- Early assisted ambulation (within 48 hours) versus delayed assisted ambulation after surgery (fixation or hemiarthroplasty): Oldmeadow 2006 (60 participants, Australia).
- Weight bearing at two weeks versus 12 weeks after internal fixation of a displaced intracapsular fracture: Graham 1968 (273 participants, UK).

Intensification of physiotherapy

- Twice daily physiotherapy versus standard regimen of once daily physiotherapy: Karumo 1977 (100 participants, Finland).
- Intensive physiotherapy comprising six hours of physiotherapy per week versus standard physiotherapy of 15 to 30 minutes each weekday: Lauridsen 2002 (88 participants, Denmark).

Weight-bearing exercises

- Two-week programme of weight-bearing exercise versus non-weight-bearing exercise: Sherrington 2003 (80 participants, Australia).

Quadriceps training programme

- Quadriceps muscle strengthening regimen for six weeks versus conventional physiotherapy alone: Mitchell 2001 (80 participants, UK).

Treadmill gait retraining programme

- Treadmill gait retraining programme versus conventional gait retraining: Baker 1991 (40 participants, Australia).

Electrical stimulation of the quadriceps

- Six-week programme of electrical stimulation of the quadriceps muscle (18 minute-long sessions) versus no electrical stimulation: Braid 2008 (26 participants, UK).
- Six-week programme of electrical stimulation of the quadriceps for three hours daily versus placebo stimulation: Lamb 2002 (27 participants, UK).

Electrical stimulation (pain alleviation)

- Electrical stimulation versus placebo stimulation: Gorodetskyi 2007 (60 participants, Russia).

Resistance training for 12 weeks (with or without nutritional supplementation)

- Twelve-week programme of resistance training versus resistance training for 12 weeks plus nutritional supplementation for six weeks versus attention control starting seven days post injury: Miller 2006 (75 participants; 63 with hip fracture, Australia).

Weight-bearing exercise for 16 weeks

- Weight-bearing exercise twice daily for 60 minutes per day for 16 weeks versus usual care (mainly non-weight bearing exercise for 30 minutes per day): Moseley 2009 (160 participants, Australia).

Continuation or community rehabilitation

The interventions tested by the seven trials in this category all started after hospital discharge but otherwise differed in important ways, such as stage of rehabilitation, duration and frequency of the rehabilitation, setting and context (e.g. outpatients or home-based; group-based or individualised; and country) and type and composition of the rehabilitative therapy. Given the inherent heterogeneity of the trials, we have described each of the seven trials separately in this section. While any grouping is imperfect, these have been ordered by the stage of rehabilitation at planned commencement: recent discharge from inpatient treatment or rehabilitation (Hauer 2002; Tsauo 2005); at completion of standard physical therapy (Binder 2004; Mangione 2005; Resnick 2007); and later home-based exercises (Sherrington 1997; Sherrington 2004). Three trials (Mangione 2005; Resnick 2007; Sherrington 2004) each had two intervention groups and one control group.

Early post-discharge rehabilitation

- Twelve weeks of intensive physical training versus placebo motor activity starting about four to five weeks after surgery upon discharge from inpatient rehabilitation: Hauer 2002 (28 participants; 3 had elective hip surgery, Germany).
- Three months, delivered in eight visits, of home-based individualised physical therapy versus unsupervised home exercise on discharge from an acute ward: Tsauo 2005 (54 participants, Taiwan).

Rehabilitation started soon after completion of standard physical therapy

- Twelve month programme of trainer-led exercise sessions with or without motivational interventions versus usual care (no intervention) after completion of standard rehabilitation: Resnick 2007 (155 participants, USA).
- Six months of supervised intensive outpatient physical therapy and exercise training versus low-intensity home exercise after completion of standard therapy: Binder 2004 (90 participants, USA).
- Twelve weeks of supervised home-based moderate to high intensity resistance training versus aerobic exercise training versus education control group after completion of usual physical therapy: Mangione 2005 (41 participants, USA).

Later stage home-based rehabilitation

- Four months of home-based weight-bearing exercises versus home-based non-weight-bearing exercises (performed in the supine position) versus no specific instructions started 22 weeks after hip fracture: Sherrington 2004 (120 participants, Australia).
- One month of home-based weight-bearing exercises started seven months after hip fracture versus usual care (no specific instructions): Sherrington 1997 (44 participants, Australia).

Excluded studies

Brief details and reasons for exclusion for 22 studies are given in Characteristics of excluded studies. The primary reasons for exclusion related to study design (six studies), study participants (six trials), and study intervention (nine trials). One trial was abandoned (Maltby 2000). The identification of Portegijs 2008 prompted a reappraisal of the review inclusion criteria such that trials had to test interventions starting within one year after hip fracture.

Ongoing studies

Details of the seven ongoing trials are given in the Characteristics of ongoing studies. Except for Kristensen, these trials evaluate continuation or community rehabilitation.

Studies awaiting classification

Two completed but unpublished trials await classification: see details in the Characteristics of studies awaiting classification.

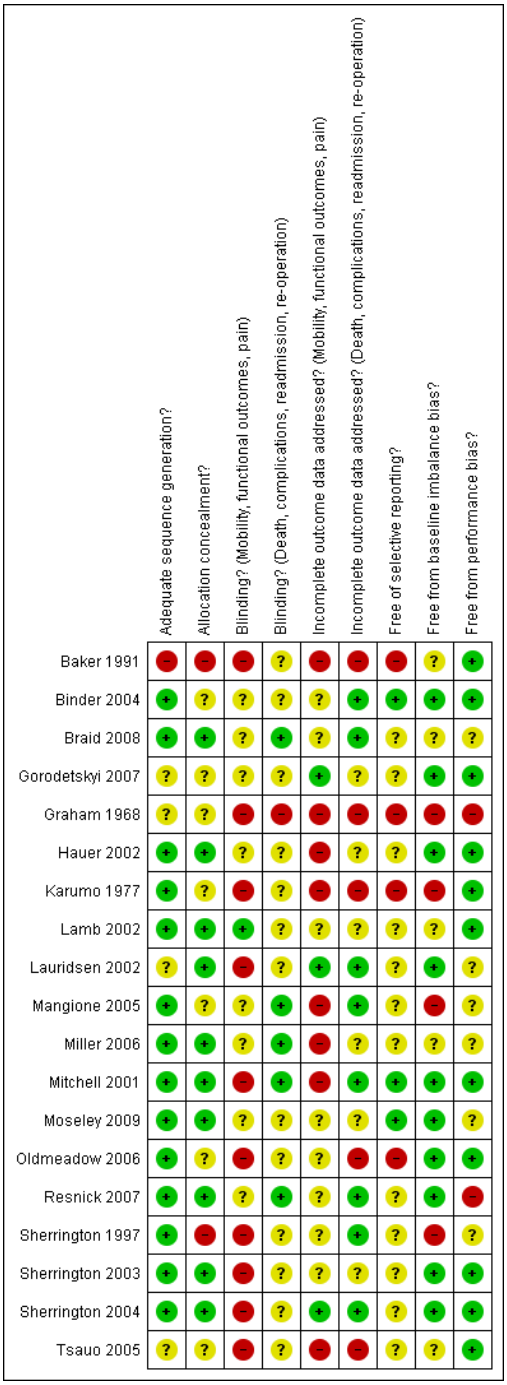
New studies found at this update

Six trials, including a total of 524 participants, were newly included in this update. Five (Braid 2008; Gorodetskyi 2007; Miller 2006; Moseley 2009; Oldmeadow 2006) were early post-surgical rehabilitation trials and one (Resnick 2007) was a community rehabilitation trial.

Risk of bias in included studies

The risk of bias judgements on nine items for the individual trials are summarised in Figure 1 and described in the risk of bias tables in Characteristics of included studies. A 'Yes' (+) judgement means that the authors considered there was a low risk of bias associated with the item, whereas a 'No' (-) means that there was a high risk of bias. The majority of assessments resulted in an 'Unclear' (?) verdict; this often reflected a lack of information upon which to judge the item. However, lack of information on blinding for mobility outcomes was always taken to imply that there was no blinding and rated as a 'No'.

Figure 1. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.



Allocation

Nine trials (Braid 2008; Hauer 2002; Lamb 2002; Miller 2006; Mitchell 2001; Moseley 2009; Resnick 2007; Sherrington 2003; Sherrington 2004) were judged at low risk of selection bias resulting from adequate sequence generation and allocation concealment; and another trial (Lauridsen 2002) also took adequate measures to safeguard allocation concealment. Conversely, Sherrington 1997, by using an open list, failed to conceal allocation. Baker 1991, a quasi-randomised trial using alternation, was at high risk of selection bias. Tsauo 2005 was the only trial providing no details of their method of randomisation.

Blinding

A low risk of detection bias for mobility and functional outcomes resulting from assessor and participant blinding was judged likely for Lamb 2002, which used placebo stimulation. While 10 other trials reported blinded assessors, the lack of reporting of adequate safeguards and the lack of blinding of participants meant that the risk of bias was considered unclear in eight and high in two trials (Lauridsen 2002; Oldmeadow 2006). No blinding was reported in eight trials.

Incomplete outcome data

Only three trials (Gorodetskyi 2007; Lauridsen 2002; Sherrington 2004) were considered to be at low risk of bias from the incompleteness of data on mobility and functional outcomes. Eight trials were deemed at high risk of bias for various reasons including large losses to follow-up, imbalances in loss to follow-up between groups, incomplete data, and post-randomisation exclusions.

Selective reporting

The lack of prospective trial registration and protocols hindered the appraisal of the risk of bias from selective reporting. Four trials (Baker 1991; Graham 1968; Karumo 1977; Oldmeadow 2006), which also featured incomplete reporting of trial results, were considered at high risk of selective reporting bias.

Other potential sources of bias

Baseline characteristics

Four trials were considered at high risk of bias in the intervention effect estimate resulting from major imbalances in baseline characteristics. This judgement resulted primarily from a lack of information on baseline characteristics in Graham 1968 and Karumo 1977; and from balance imbalances in Mangione 2005 (the control group was more depressed and started the study seven weeks earlier than the two intervention groups) and Sherrington 1997 (disproportionately more males in the intervention group).

Care programmes

Risk of performance bias from important differences between intervention and control groups in care programmes other than the trial interventions or differences in the experience of care providers was judged as low in 10 trials, unclear in seven trials (usually based on inadequate information) and high in two trials (Graham 1968; Resnick 2007). Graham 1968 provided no information on care programmes. The extreme variation (28 to 200 days) in the timing of the first intervention visit from the trainer to the patients in Resnick 2007 may have affected trial findings.

Effects of interventions

The results of the 19 included trials are presented according to two main categories representing the basic stage in the rehabilitation process when the trial intervention(s) commenced: either early post-operative rehabilitation, or continuation/community rehabilitation. Where considered appropriate and where data are available, the outcomes of individual trials are presented in the analyses. The interventions or settings or participants, or a combination of any of these, of all the trials included so far were too dissimilar to warrant pooling. We note that if pooling had been undertaken, it would have been limited due to the range of outcome measures used in the trials.

Early post-operative rehabilitation

Of the 12 trials in the category, two pairs of trials tested similar interventions: Karumo 1977 and Lauridsen 2002) tested the use of more intensive physiotherapy; Braid 2008 and Lamb 2002 evaluated a six-week programme of electrical stimulation of the quadriceps muscle. Two trials (Graham 1968; Oldmeadow 2006) tested early mobilisation but their interventions and time frames were incompatible.

Early assisted ambulation (within 48 hours) versus delayed assisted ambulation (after 48 hours) after surgery

Oldmeadow 2006 tested this comparison in 60 people. Incomplete data were provided for mobility outcomes and follow-up was only up to discharge from the acute ward.

Primary outcomes

There were 10 participants in the early ambulation group who failed to start walking until after 48 hours. The data for these are included in intention-to-treat analyses in the following (*see* Analysis 1.1: time to first walk). After seven days, fewer people in the early ambulation group required assistance for transfers (10/29 versus 21/31; risk ratio (RR) 0.51, 95% CI 0.29 to 0.89), but more in this group were unable to able to take a step without assistance (13/29 versus 1/31; RR 13.90, 95% CI 1.94 to 99.64) (*see* Analysis 1.2). At seven days, people in the early ambulation group had walked on average over twice the distance as those in the delayed ambulation group (*see* Analysis 1.3).

One person in the early ambulation group died before discharge (*see* Analysis 1.4). Seventeen participants of the early ambulation group and 18 in the delayed ambulation group were tested for troponin levels in response to evidence of a significant cardiac event or complaints of chest pain (*see* Analysis 1.4 for positive test results). Oldmeadow 2006 reported, without presenting data, that ambulation was usually not attempted where there was indication of a cardiovascular challenge.

Secondary outcomes

One person in the early ambulation group was discharged to a nursing home. Otherwise, fewer people in the early ambulation group were discharged to a rehabilitation facility (24/29 versus 30/31; RR 0.86, 95% CI 0.72 to 1.02; *see* Analysis 1.5) and thus more were returned home (5/29 versus 1/31). The difference between the two groups in length of stay in the acute ward was reported as not being statistically significant (*see* Analysis 1.6).

Weight bearing at two weeks versus 12 weeks after internal fixation of an intracapsular hip fracture

Graham 1968 tested this comparison in 273 people; the three year follow-up data were available for 175 trial participants only.

Primary outcomes

Only adverse effects were recorded; there was no report on mobility or other measures of function for this trial. There were no statistically significant differences between the two groups in mortality (*see* Analysis 2.1) at either one year (19/141 versus 24/132; risk ratio (RR) 0.74, 95% confidence interval (CI) 0.43 to 1.29) or three years. Fracture non-union was termed failure of fixation and included those fractures in which early re-displacement occurred (early mechanical failure) and those in which the fracture failed to heal. Redisplacement of the fracture occurred in all these cases. There were no statistically significant differences between the two groups in the failure rate (*see* Analysis 2.2) for survivors who were followed up at either one year (18/116 versus 14/96; RR 1.06, 95% CI 0.56 to 2.03) or three years. These results exclude trial participants who had died (43/273 at one year, 44/175 at three years), or for whom there was incomplete follow up or who were lost to follow-up (13/273 at one year, 16/175 at three years), or those in whom an infection of the hip occurred (5/273 at one year, 3/175 at three years).

Avascular necrosis was termed 'superior segmental collapse'. At one year, avascular necrosis (*see* Analysis 2.3) was marginally less in the early weight bearing group (3/116 versus 9/96; RR 0.28, 95% CI 0.08 to 0.99). However, the difference was not statistically significant in survivors at three years (10/57 versus 14/55; RR 0.69, 95% CI 0.33 to 1.42).

At one year, infections of the hip, reported as septic arthritis, requiring further surgical treatment were reported in two out of 141 people in the early weight-bearing group and three out of 132 people in the delayed weight-bearing group.

A separate analysis (Analysis 2.4) of unfavourable outcome, which includes death, hip infection, non-union and avascular necrosis, shows no statistically significant differences at either one year (42/141 versus 50/132; RR 0.79, 95% CI 0.56 to 1.10) or three years (46/85 versus 51/90; RR 0.96, 95% CI 0.73 to 1.25).

Apart from infection of the hip, there was no report of post-operative complications aside from the post-randomisation exclusion at two weeks of any person with pulmonary or cardiac complications, deep venous thrombosis and "general feebleness".

Secondary outcomes

These outcomes were not reported.

Intensive physiotherapy regimen versus standard physiotherapy

Both Karumo 1977 (100 participants) and Lauridsen 2002 (88 participants) evaluated an intensification of physiotherapy. Follow-up in Karumo 1977 was nine weeks, aside from mortality which was at three months. The results of Karumo 1977 were mainly for the overall trial population or by surgical treatment group than for the trial interventions. In Lauridsen 2002, 37 trial participants failed to complete the stipulated training programme. While Lauridsen 2002 presented "intention-to-treat" and "per protocol" analyses up to discharge from hospital, many results were presented as medians and ranges.

Primary outcome

Karumo 1977 reported that there was no "demonstrable" difference in the recovery of the two trial groups by nine weeks. Of 87 participants, 25 were walking without crutches, 55 were walking with crutches with or without assistance, and seven were bedridden. Lauridsen 2002 reported function as identical in those participants of the two groups who completed their training regimen, where 90% were able to walk with one or two walking sticks at

discharge. In contrast only 35% of people not completing the programme reached this level.

Karumo 1977 reported that 10 participants had mechanical post-operative complications. Ten participants (6 versus 4) of Lauridsen 2002 were withdrawn because of "orthopaedic complications" including redisplacement, screw penetration, hip dislocation and femoral head necrosis (*see* Analysis 3.1).

Nine participants in Karumo 1977 had postoperative wound infection, and one person died of pulmonary embolism; there were no other thromboembolic complications. Karumo 1977 reported that there were no inter-group differences in complications. However, the results for post-operative complications are confounded as antibiotic prophylaxis and antithrombotic prophylaxis were given to only a subgroup of trial participants, 37 and 49 respectively.

Karumo 1977 reported no difference in mortality between the two groups: 11 participants, out of a total of 96 (rather than the 100 recruited), died within three months.

Secondary outcomes

At nine weeks, of 87 participants reported in Karumo 1977, 18 were in hospital and four were in a home for the elderly; these data were not split by treatment group. Results at nine weeks for abductor muscle strength showed no statistically significant difference between the two groups of Karumo 1977 (*see* Analysis 3.2).

Almost twice as many participants in the intensive group of Lauridsen 2002 failed to complete their training regimen (24/44 versus 13/44; RR 1.85, 95% CI 1.09 to 3.14; *see* Analysis 3.3). More participants in the intensive group voluntarily quit the training programme, mainly because the programme exceeded their "physical or psychical capacity" (6/44 versus 1/44; RR 6.00, 95% CI 0.75 to 47.80; *see* Analysis 3.4). Though participants in the intensive group were offered six hours of physiotherapy per week (expected training intensity of 0.86 hours/day), generally the uptake was much less (*see* Analysis 3.5). Nonetheless, training intensity was reported as statistically significantly greater in the intensive group (median intensity: 0.5 versus 0.2 hours/day; *see* Analysis 3.5).

There was no statistically significant difference in the length of hospital stay between the two groups of either Karumo 1977 (*see* Analysis 3.6) or, when intention-to-treat analysis was undertaken, Lauridsen 2002 (*see* Analysis 3.7). Notably, Lauridsen 2002 reported a significantly shorter length of stay in the intensive group for people completing the training regimen (per protocol analysis).

Two-week weight-bearing exercise programme versus non-weight-bearing exercise programme

Sherrington 2003 made this comparison in 80 patients. Outcome was assessed at the end of the two-week programmes. The data for three trial participants, one who withdrew consent in the weight-bearing group and two with actual or suspected problems with fracture fixation in the non-weight-bearing group, were generally not provided in Sherrington 2003. Results for outcome measures, such as sway, measured only in a subgroup of participants are not presented here.

Primary outcomes

By the end of two weeks, there were marginally significantly fewer participants of the weight-bearing exercise group unable to walk unassisted or using just one walking stick (33/41 versus 37/39; RR 0.85, 95% CI 0.72 to 1.00; *see* Analysis 4.1), and statistically significantly fewer unable to a lateral step-up (on to a block) on the fractured leg with nil or one hand support (18/40 versus 30/37; RR 0.56, 95% CI 0.38 to 0.81; see Analysis 4.2). Though all tending to favour weight-bearing exercises, none of the differences between the two groups in the other objective measures of mobility and function (an overall physical performance and mobility score: *see* Analysis 4.3; gait parameters: *see* Analysis 4.4; and balance: *see* Analysis 4.5) were statistically significant. Similarly, there were no significant differences for subjective ratings of pain, perceived risk of falls, balance, sleep quality and general health (*see* Analysis 4.6). No deaths or medical complications were reported in Sherrington 2003. Two participants in the non-weight-bearing group were unable to complete the trial due to actual or suspected fracture healing complications (*see* Analysis 4.7).

Secondary outcomes

There were no statistically significant differences between the two groups in strength (*see* Analysis 4.8). As shown in Analysis 4.9, similar numbers of participants in the two groups found the exercises difficult or very difficult (14/40 versus 12/37), experienced moderate or worse pain while performing the exercises (17/40 versus 18/37), and had some doubts on the usefulness of the exercises (12/40 versus 7/37).

There was no difference between the two groups in the length of stay in the inpatient rehabilitation ward (24.1 versus 25.2 days); nor in hospital (36.2 versus 38.5 days: *see* Analysis 4.10).

Quadriceps training programme versus conventional physiotherapy alone

Mitchell 2001 evaluated the addition to conventional physiotherapy of a quadriceps muscle strengthening programme over a six week period in 80 patients. Outcome was assessed at six weeks in 59 participants and 16 weeks in 44 participants.

Primary outcomes

Functional mobility assessed using the Elderly Mobility Scale was reported to be statistically significantly better in the intervention

group at both follow-up times (*see* Analysis 5.1). None of the differences between the two groups were statistically significant for gait speed (see Analysis 5.2) or timed up go (*see* Analysis 5.3). Although functional reach was better in the intervention group at both follow-up times (*see* Analysis 5.4), the clinical significance of these small differences is uncertain.

Seven participants (4 versus 3) had died by 16 weeks (*see* Analysis 5.5) and 13 participants (8 versus 5) recorded with new comorbidities were excluded from follow-up (*see* Analysis 5.6). Neither fracture healing complications nor post-operative complications were reported.

Secondary outcomes

The statistically significant difference in favour of the intervention group at six weeks in the Barthel index was not evident at 16 weeks (*see* Analysis 5.7). Of the six components of the Nottingham Health Profile (physical mobility, pain, energy, emotional reactions, sleep, social isolation), only the difference in energy at 16 weeks (reported P = 0.0185) reached statistical significance (*see* Analysis 5.8 for the first three components). The significant difference in leg extensor power in favour of the intervention at six weeks was still evident 10 weeks later (*see* Analysis 5.9).

The intervention group participants attended a median of 11 sessions of quadriceps training (range 10 to 12 sessions). There was no difference reported in hospital stay (median 39 days versus 40 days).

Treadmill gait retraining programme versus conventional gait retraining

Baker 1991 compared a treadmill gait retraining programme with conventional gait retraining in 40 elderly women. Measures of outcome were primarily patient mobility, and gait analysis undertaken during the patient's stay in the rehabilitation hospital, with results being reported for the time of discharge. The group allocations for the only death and the five other participants requiring nursing home or special accommodation were not given.

Primary outcomes

Fewer treadmill group participants failed to regain their pre-fracture mobility level (7/20 versus 12/20; RR 0.58, 95% CI 0.29 to 1.17; *see* Analysis 6.1). There was no statistically significant difference in the gait parameters (based on data extracted from a graph: *see* Analysis 6.2). Baker 1991 did not report on fracture healing or post-operative complications.

Secondary outcomes

Baker 1991 stated that the overall return home rate was "80.5%"; this did not correspond to a whole number of participants and may have resulted from an undeclared loss of trial participants from the analyses. There was no report of functional and quality of life measures. Mean length of hospital stay was 54 days for the treadmill group versus 67 days for the control group, a difference that was reported as not being statistically significant.

Electrical stimulation of the quadriceps versus no or placebo stimulation

Two trials (Braid 2008; Lamb 2002) evaluated a six-week programme of electrical stimulation of the quadriceps muscle in a total of 53 older people with hip fracture. Lamb 2002 was placebo controlled. At final follow-ups of 14 and 13 weeks respectively, data for mobility outcomes were unavailable for five (2 deaths, 3 withdrawals) or more participants of Braid 2008 and for three participants (2 required further hospitalisation, 1 withdrawal) of Lamb 2002.

Primary outcomes

Braid 2008 reported no statistically significant differences between the two groups in the Elderly Mobility Scale (Prosser 1997) change scores from baseline at the end of the six week intervention period and at final follow-up (*see* Analysis 7.1). In Lamb 2002, half as many stimulation group participants compared with placebo group participants had not regained their pre-fracture mobility (5/12 versus 10/12; RR 0.50, 95% CI 0.24 to 1.02; *see* Analysis 7.2) at the end of the six week stimulation regimen. The difference between the two groups increased and was statistically significant at final follow-up (failure to regain mobility: 3/12 versus 9/12; RR 0.33, 95% CI 0.12 to 0.94; *see* Analysis 7.2). Where differences occurred between the two groups of Lamb 2002 in gait velocity, in the ability to 'tandem stand', a measure of postural stability, or in pain, none were statistically significant (*see* Analysis 7.3, Analysis 7.4 and Analysis 7.5). One person in each group of Braid 2008 died between six and 14 weeks follow-up. There was no report of mortality in Lamb 2002.

Secondary outcomes

Although a trend was reported in Braid 2008 for greater strength and less disability in the control group, both unadjusted and adjusted results were found not to show statistically significant differences between the two groups in general functioning at the end of the intervention period and at 14 weeks (see Barthel Index results: Analysis 7.7; and Nottingham Health Profile results: Analysis 7.8). Neither trial found statistically significant differences between the two groups in leg extensor power in the fractured or non-fractured limb after the intervention period or at final follow-up (*see* Analysis 7.9 and Analysis 7.10).

Braid 2008 reported a low baseline tolerance of electrical stimulation such that only three participants could tolerate an intensity sufficient for knee extension. The 13 participants who returned

for the six week assessment attended a median of 10 sessions (interquartile range 6 to 17 sessions). Compliance in Lamb 2002 was reported to be over 75%, with no difference between the intervention and placebo groups.

Electrical stimulation (pain alleviation) versus placebo stimulation

Gorodetskyi 2007 evaluated electrical stimulation in 60 older people. The impact on pain and pain-related function was the focus of Gorodetskyi 2007, where the electrodes of the active or sham electrical stimulator device were placed at three sites close to surgical incision. Follow-up was completed at 10 days, upon completion of the final treatment session.

Primary outcomes

Participants receiving electrical stimulation reported substantially and significantly less interference from pain on walking ability after each of the 10 sessions. The final visual analogue results on day 10 are presented in Analysis 8.1. Pain scores, which decreased over the 10 days treatment period in both groups, were also markedly less in the electrical stimulation group.

Secondary outcomes

Overall assessment of recovery based on a five category scale by an orthopaedic surgeon who was blinded to treatment allocation found a large and significant difference in favour of the electrical stimulation group. All 30 participants in the electrical stimulation group had either substantial or full recovery, whereas none achieved this in the control group and only half achieved average rating (*see* Analysis 8.2). As shown graphically in the trial report, hip flexion was greater in the electrical stimulation group after each treatment session; the reported results for the ninth day are tabulated in Analysis 8.3.

Resistance training for 12 weeks versus resistance training for 12 weeks plus nutritional supplementation for six weeks versus attention control

Miller 2006 evaluated this comparison in 75 people with a lower-limb fracture, of whom 63 had hip fracture. Functional outcomes were assessed after 12 weeks in 70 participants. One-year follow-up data for mortality, readmission and admission to a higher level of care were provided in a conference abstract. Aside from mortality at one year, the results presented in the following apply to all the whole population. There were some uncertainties about the denominators for some of the outcome measures. Overall adherence to resistance training was reported to be over 86% of all exercises performed.

Resistance training for 12 weeks versus attention control

Primary outcomes

Miller 2006 reported no statistically significant differences between the two groups in the SF-12 physical component score (*see* Analysis 9.1) or gait speed (*see* Analysis 9.2) at 12 weeks. There was no significant differences between the two groups in mortality at 12 weeks or at one year (6/21 versus 4/20; RR 1.43, 95% CI 0.47 to 4.32;*see* Analysis 9.3). Similar findings applied to hospital readmission (*see* Analysis 9.4)

Secondary outcomes

Miller 2006 found no statistically significant differences between the two groups in those admitted to a higher level of care at both follow-up times (*see* Analysis 9.5), in the SF-12 mental component score (*see* Analysis 9.6) or quadriceps strength at 12 weeks (*see* Analysis 9.7). There was no statistically significant difference in length of stay in the acute setting or overall hospital stay (*see* Analysis 9.8).

Resistance training for 12 weeks plus nutritional supplementation for six weeks versus attention control

Primary outcomes

Miller 2006 reported no statistically significant differences between the two groups in the SF-12 physical component score (*see* Analysis 10.1) or gait speed (*see* Analysis 10.2) at 12 weeks. There were no significant differences between the two groups in mortality at 12 weeks or at one year (4/22 versus 4/20; RR 0.91, 95% CI 0.26 to 3.16; *see* Analysis 10.3). Similar findings applied to hospital readmission (*see* Analysis 10.4).

Secondary outcomes

Miller 2006 found no statistically significant differences between the two groups in those admitted to a higher level of care at both follow-up times (*see* Analysis 10.5), or in the SF-12 mental component score (*see* Analysis 10.6) or quadriceps strength at 12 weeks (*see* Analysis 10.7). There was no statistically significant difference in length of stay in the acute setting or overall hospital stay (*see* Analysis 10.8).

Weight-bearing exercise twice daily for 60 minutes per day for 16 weeks versus usual care (mainly non-weight bearing exercise for 30 minutes per day)

Moseley 2009 tested this comparison in 160 participants.

Primary outcomes

There were no statistically significant differences between participants allocated high-dose weight-bearing exercise versus those in the control group in the inability to walk independently or in self-rated mobility (*see* Analysis 11.1), in physical performance (*see* Analysis 11.2) nor walking speed (*see* Analysis 11.3). The intervention group performed better in the 'stand to sit' test (see Analysis 11.4) but the clinical significance of the difference is uncertain. There were also no statistically significant differences between the two groups for two objective measures of balance (*see* Analysis 11.5). This finding applied also to subjective ratings of pain, perceived balance and strength (*see* Analysis 11.6). There was no statistically significant difference between the two groups in mortality or readmissions (*see* Analysis 11.7), nor in the numbers who fell at least once during the intervention period (*see* Analysis 11.8).

Secondary outcomes

The median Barthel index score was identical in the two groups at 16 weeks and implied a high level of independence in activities of daily living. There was no statistically significant difference in institutional residence at 16 weeks but in those participants remaining in the community, more in the intervention group were accessing community services (*see* Analysis 11.10). There were no statistically significant differences between the two groups in quality of life assessment (*see* Analysis 11.11), muscle strength (*see* Analysis 11.12), negative effects of treatment (*see* Analysis 11.13) nor in the length of inpatient rehabilitation (*see* Analysis 11.14).

Continuation or community rehabilitation

Seven trials tested interventions started after discharge from hospital. We present these in three groups according to the stage of rehabilitation and context. Two small trials (Hauer 2002; Tsauo 2005) evaluated interventions started shortly after discharge. Though both trials evaluated an intensification of physiotherapy (extent and provision respectively), we present these separately below given the trials' interventions and settings are markedly different with few directly comparable outcome measures.

Twelve-week intensive physical training versus placebo activities after discharge from inpatient rehabilitation

In Hauer 2002, 28 women who were home-dwelling prior to hospital admission started the physical training or placebo activities interventions about four to five weeks after surgery upon discharge from inpatient rehabilitation. Aside from loss of social independence, outcome data at six months follow-up were not available for four trial participants. Follow-up data were also collected at the end of the 12-week training period. The results presented here generally apply to the six-month follow up, taking place three months after the termination of the training.

Primary outcomes

Though the results of the performance oriented mobility assessment (POMA) favoured the intensive training group, none of the differences were statistically significant (*see* Analysis 12.1). Participants of the intervention group had faster walking velocity (mean difference (MD) 0.23 m/sec, 95% CI 0.05 to 0.41; *see* Analysis 12.2) and tended to have larger box step values than those participating in placebo activities (*see* Analysis 12.2).

Intervention group participants did better in the functional performance tests, in particular in stair climbing performance (time for stair rise; MD -7.80 seconds, 95% CI -15.14 to -0.46 seconds: *see* Analysis 12.3). There were no statistically significant differences in the objective measures of balance (*see* Analysis 12.4). However, participants in the intervention group had significantly better Fall Handicap Inventory scores, were less fearful of falling, and felt steadier (*see* Analysis 12.5). There was no difference between the two groups in overall feeling of depression, nor in morale.

Though, 11 of the 57 participants in Hauer 2002 had died by two-years follow-up, separate mortality data for the 28 hip surgery patients were not available. Hauer 2002 reported that no major health problems occurred during training or testing and that all the minor problems, including knee pain and wound or scar aching, were resolved by adjustment of training and physiotherapy.

Secondary outcomes

At the end of follow-up, three intervention group participants had moved to live with relatives or into a nursing home compared with four in the control group (see Analysis 12.6). Nonetheless, the Barthel's activities of daily living (ADL) and Lawton's instrumental ADL results indicated high levels of independence and functional competence in both groups at six-months follow-up (*see* Analysis 12.7). Self-reported physical activity which was low at baseline in both groups, though slightly higher in the intensive group, increased during the training period in the intensive group but was diminishing back to the baseline values by six-months follow-up. The statistically significant difference for self-reported total activity at six months between the two groups has to be set into the context of the already low readings for the trial participants.

Strength measures were consistency higher in the intensive training group and differences between the two groups were statistically significantly different for leg extensor muscle strength (*see* Analysis 12.8).

Two intensive group participants and one control group participant did not start their allocated group sessions, and a further participant of the intensive group gave up after starting "because of motivational reasons". Perhaps helped by the provision of transport to training locations, adherence to the group activities was high in both groups (*see* Analysis 12.9). Hauer 2002 estimated that the training intervention more than doubled the total physical activity in the intensive therapy group; however, as reported above, the physical activity level of this group returned to almost baseline levels after training had ceased. While there was no mention of costs in Hauer 2002, it is noteworthy that the group sessions provided in Hauer 2002 to both groups were on top of twice weekly sessions of physiotherapy provided to all trial participants.

Three months, delivered in eight sessions, of a home-based individualised physical therapy programme versus unsupervised home exercise on discharge from an acute ward

Tsauo 2005 tested the comparison in 54 people, but provided data only for the 25 people available at six-months follow-up.

Primary outcomes

There was some evidence of a speedier recovery in function in the intervention group as indicated by the statistically significantly higher Harris hip and quality of life (WHOQOL-BREF physical and psychological domains) scores at three months (*see* Analysis 13.1 and Analysis 13.2). These differences were diminished at six months and the difference in the physical domain of the quality of life score was no longer statistically significant (*see* Analysis 13.2). There was no between-group differences in walking speed at six months (*see* Analysis 13.3).
One person in each group had a wound infection. In the physical therapy group, two people refractured their hips and one had gastric tract bleeding (*see* Analysis 13.4). No deaths were reported.

Secondary outcomes

One person of each group transferred to a nursing home because their families could not take care of them. There were no between-group differences at six months in measures of muscle strength (*see* Analysis 13.5) and range of motion (*see* Analysis 13.6). There was no mention of costs in Tsauo 2005. No information on adherence, participant satisfaction was given aside from the exclusion from the analyses of four people in the home-based physical therapy group because of low compliance.

Twelve month programme of trainer-led exercise sessions with or without motivational interventions versus usual care (no intervention) after completion of standard rehabilitation

Resnick 2007 made this comparison in 155 people who had received standard rehabilitation, for around one month, after surgical repair of their hip fracture. The primary focus of this trial was on psychological/behavioural outcomes of self-efficacy and expectations, and outcomes relevant to this review are limited. The two interventions are presented as subgroups in the analyses. Notably, the final assessment at 12 months from fracture coincided with the planned end point of the intervention.

Primary outcomes

Activity level expressed in terms of hours of exercise per week was significantly greater in both exercise groups compared with the control group (*see* Analysis 14.1 exercises only: MD 2.42 hours, 95% CI 1.05 to 3.79). Over a 48 hour period, the exercises only group performed significantly more steps (*see* Analysis 14.2, MD 2399, 95% CI 142.81 to 4655.19). Resnick 2007 reported that the exercise plus group did not show statistically significantly higher step activity compared with the control group. Similar numbers of deaths occurred in the three groups (*see* Analysis 14.3)

Secondary outcomes

Greater, but not statistically significantly greater, numbers refused to participate, either in the training or measurement, in the intervention groups (*see* Analysis 14.4). The mean numbers of intervention visits were 17.3 in the exercise only group and 21.2 in the exercise plus group. Eighteen randomised to exercise only and 15 to the exercise plus intervention were not willing to have any intervention visits; those who were willing generally delayed their first visit until after 60 days after their fracture.

Six months of supervised intensive physical therapy and exercise training versus home exercise after completion of standard therapy

Binder 2004 made this comparison in 90 community dwellers. All participants were within 16 weeks of hip fracture surgery, having completed standard physical therapy but with persistent mobility impairments. We report the results at the final six month follow-up.

Primary outcomes

Participants of the intensive therapy group had statistically significantly higher Physical Performance Test scores compared with those of the home exercises only group (*see* Analysis 15.1; MD 5.70, 95% CI 2.74 to 8.66). Fewer participants in the intensive therapy group continued to require a walking aid (14/33 versus

24/35; RR 0.62, 95%CI 0.39 to 0.98; *see* Analysis 15.2). Participants in this group also walked more quickly (MD 13.50 m/min, 95% CI 2.95 to 24.05 m/min; *see* Analysis 15.3) and had better balance (*see* Analysis 15.4).

One person of the home exercise group died from causes unrelated to the study. Fourteen people in the intensive therapy group and eight in the people in the home exercise group withdrew from the study (*see* Analysis 15.5); in two versus three cases respectively these were for personal reasons reported to be related to the study. In nine versus six cases withdrawal was for medical problems that were "unrelated to exercise performance"; these included two people in each group with additional fractures (sacral fracture and ulnar fracture in the intervention group; and two contralateral hip fractures in the control group). Three people sustained adverse events directly related to the physical therapy (intense) intervention, these were: a rib fracture, a metatarsal fracture and a bruised ankle. Nonetheless all three individuals were able to complete the exercise programme.

Secondary outcomes

The effects of the intervention on function and disability were less clear (*see* Analysis 15.6). Although the intensive therapy group had better scores, the differences between the two groups were small for the three outcome measures and only statistically significant for the Functional Status Questionnaire score (mean difference 2.50, 95% CI 0.07 to 4.93; *see* Analysis 15.6).There was also some indication of a greater effect of intensive therapy on quality of life (*see* Analysis 15.7). In particular there was a statistically and possibly clinically significant difference between the groups for the SF-36 Physical Function subscale score (MD 11.00, 95% CI 0.42 to 21.58). Participants in the intensive therapy group had better leg strength (*see* Analysis 15.8). Adherence in the intensive group to the 72 prescribed exercise sessions was 87% among the 44 people who provided follow-up data. Of the 32 participants in the home exercise group who completed exercise logs, adherence was 131% which reflected that some participants exercised more than the prescribed three times per week.

Costs were not calculated in Binder 2004 but the authors noted that the intensive group were prescribed 72 treatment sessions, which is more than funding arrangements in the USA allowed for at the time.

Three months of home-based high intensity resistance versus aerobic exercise training versus education control group after completion of usual physical therapy

Mangione 2005 compared 12 weeks of moderate to high-intensity resistance training versus aerobic training (each supervised by a physical therapist in 20 visits) versus bi-weekly mailings in 41 people who had completed physical therapy after a hip fracture. The start of the study ranged from 7.0 to 50.5 weeks. The results from this trial are presented for four comparisons: (1) home-based resistance or aerobic exercise training versus control; (2) home-based resistance exercise training versus control; (3) home-based aerobic exercise training versus control; (4) home-based resistance versus aerobic exercise training. There were clinically important baseline differences between the two training groups and that of the control group. These included a seven week difference in the average time for surgery to the start of the study (19.4 versus 19.7 versus 12.6 weeks) and higher depression scores in the control group. Six of the eight people who were lost to follow-up were from the resistance training group. The results at 12 weeks are presented below.

Adherence (number of sessions attended over 20 total sessions) to the exercise programmes was reported to be 98% and reported not to differ between the two exercise groups. Ninety-five per cent of sessions were conducted at the target intensity but 4% were altered because of pain. Mangione 2005 did not report on costs.

Three months of home-based high intensity resistance training or aerobic training versus education control group after completion of usual physical therapy

Primary outcomes

There were no statistically significant differences between the combined results of the two training groups and the control group for gait (free gait speed or 6-minute walk test) (*see* Analysis 16.1) or functional ability (SF-36 physical function score) (*see* Analysis 16.2).

Mangione 2005 reported that four people allocated resistance training were hospitalised. Of these two died, one went into long-term care and one had surgery. These four and two others from the resistance group, and one each from the aerobic and control groups withdrew from the trial. Of these, two withdrew because of the exercise intervention in the combined exercises training group and one in the control group found the testing was too much. Another person in the exercise training groups fell during the follow-up assessment and several people of the resistance training group reported muscle soreness or fatigue after exercise. Others in the same group reported that their muscles "felt alive again".

Secondary outcomes

There were no statistically significant differences between the training groups and the control group for strength (maximum voluntary isometric force of the lower extremity) (*see* Analysis 16.3).

Three months of home-based high intensity resistance training versus education control group after completion of usual physical therapy

Primary outcomes

There were no statistically significant differences between the resistance training group and the control group in gait outcomes (free gait speed or 6-minute walk test) (*see* Analysis 17.1) or functional ability (SF-36 physical function score) (*see* Analysis 17.2).
Mangione 2005 reported that four people allocated resistance training were hospitalised. Of these two died, one went into long-term care and one had surgery. These four and two others (one of whom was found to have a progressive neuromusculoskeletal disorder) from the resistance group and one from the control group withdrew from the trial. Of these, one withdrew from the resistance group because they preferred other physical therapy and one in the control group found the testing too much. One person whose exercise group was not identified fell during the follow-up assessment. Several people of this group reported muscle soreness or fatigue after exercise. Others in the same group, however, reported that their muscles "felt alive again".

Secondary outcomes

There were no statistically significant differences between the results of the resistance training group and the control group for strength (maximum voluntary isometric force of the lower extremity) (*see* Analysis 17.3).

Three months of home-based aerobic training versus education control group after completion of usual physical therapy

Primary outcomes

There were no statistically significant differences between the aerobic training group and the control group in gait (free gait speed or 6-minute walk test) (*see* Analysis 18.1) or functional ability (SF-36 physical function score) (*see* Analysis 18.2).
Mangione 2005 reported that one person in the resistance group withdrew because they were unable to perform the exercises and one person in the control group withdrew because they found the testing too much. One person whose exercise group was not identified fell during the follow-up assessment.

Secondary outcomes

There were no statistically significant differences between the two groups in strength (maximum voluntary isometric force of the lower extremity) (*see* Analysis 18.3).

Three months of home-based high intensity resistance training versus aerobic training after completion of usual physical therapy

Primary outcomes

There were no statistically significant differences between the two exercise training groups in gait outcomes (free gait speed or 6-minute walk test) (*see* Analysis 19.1) or functional ability (SF-36 physical function score) (*see* Analysis 19.2)
Mangione 2005 reported that four people allocated resistance training were hospitalised. Of these two died, one went into long-term care and one had surgery. These four and two others from the resistance group, and one from the aerobic group withdrew from the trial. Of these, one resistance group participant withdrew because they preferred other physical therapy and one aerobic group participant was unable to perform the exercises. One person whose exercise group was not identified fell during the follow-up assessment. Several people of the resistance training group reported muscle soreness or fatigue after exercise. Others in the same group reported that their muscles "felt alive again".

Secondary outcomes

There were no statistically significant differences between the two exercise training groups for strength (maximum voluntary isometric force of the lower extremity) (*see* Analysis 19.3).

Four-month long home-based exercise programmes started 22 weeks after hip fracture

The 120 participants in Sherrington 2004 were randomised to receive one of three interventions: home-based weight-bearing exercises versus home-based non-weight-bearing exercises (performed in the supine position) versus no specific instructions (control group). Exercises in the two intervention groups were prescribed for a minimum of four months. The results from this trial are presented for four comparisons: (1) a home-based exercise programme (either weight or non-weight-bearing exercises) versus control; (2) weight-bearing exercise programme versus control; (3) non-weight-bearing exercise programme versus control; (4) weight-bearing versus non-weight-bearing exercise programmes. Trial participants were assessed at one and four months; the results from four months are presented here. There was no mention of costs in Sherrington 2004.

A home-based exercise programme (either weight or non-weight-bearing exercises) versus control

Primary outcomes

There were no statistically significant differences between participants allocated home-based exercises and those in the control group in various measures of mobility (*see* Analysis 20.1), in physical performance (*see* Analysis 20.2), in gait parameters (*see* Analysis 20.3), or in measures of functional performance (*see* Analysis 20.4). There were also no statistically significant differences between the intervention and control groups in various objective measures of balance (*see* Analysis 20.5). This finding applied also to subjective ratings of pain, perceived risk of falls, sleep quality and general health (*see* Analysis 20.6); there were, however, statistically significantly fewer people in the exercise groups reporting unsteady balance (53/72 versus 32/36; RR 0.83, 95% CI 0.69 to 0.99). There was no statistically significant difference between groups in the numbers who fell at least once during the intervention period (*see* Analysis 20.7). Despite these statistically non-significant findings for individual outcomes, there is a consistent picture of better mobility and balance in the combined exercises groups.

Five deaths (four in the exercises groups and one in the control group) were reported (*see* Analysis 20.8). Four people were reported as being unable to complete the physical assessment at four months because of ill health. It should be noted that Sherrington 2004 had already excluded people with medical conditions and complications from the fracture resulting in delayed healing and associated weight-bearing restrictions.

Secondary outcomes

There were no statistically significant differences between the exercises and control groups in various objective measures of strength (*see* Analysis 20.9). At the end of the trial period, 29% of those assessed in the exercises groups were doing the exercises fewer than three times weekly. This includes 19% who had given up completely. There was no monitoring of the use of home-based exercises in the control group.

A home-based weight-bearing exercise programme versus control

Primary outcomes

There were no statistically significant differences between home-based weight-bearing exercises and control group participants in various measures of mobility (*see* Analysis 21.1), physical performance (*see* Analysis 21.2), gait parameters (*see* Analysis 21.3), or in measures of functional performance (*see* Analysis 21.4). Objective measures of balance favoured the exercise group but only the difference in functional reach was statistically significance (MD 5.40 cm, 0.96 to 9.84 cm; *see* Analysis 21.5). There were no statistically significant differences between the two groups in subjective ratings of pain, perceived risk of falls, balance, sleep quality and general health (*see* Analysis 21.6); nor in the numbers who fell at least once during the intervention period (*see* Analysis 21.7).

Four deaths (three versus one) were reported (*see* Analysis 21.8).

Secondary outcomes

Though the six measures of muscle strength were consistently better in the weight-bearing group, only the difference in knee extension strength of the fractured leg reached statistical significance (MD 40.00 newtons, 95% CI 4.50 to 75.50 newtons: *see* Analysis 21.9)). At the end of the trial period, 31% of those assessed in the exercises group were doing the exercises fewer than three times weekly. This includes 20% who had given up completely. There was no monitoring of the use of home-based exercises in the control group.

A home-based non-weight-bearing exercise programme versus control

Primary outcomes

There were no statistically significant differences between home-based non-weight-bearing exercises and control group participants in various measures of mobility (*see* Analysis 22.1), physical performance (*see* Analysis 22.2), gait parameters (*see* Analysis 22.3), or in measures of functional performance (*see* Analysis 22.4). There were also no statistically significant differences between the two groups in various objective measures of balance (*see* Analysis 22.5). This finding applied also to subjective ratings of pain, perceived risk of falls, balance, sleep quality and general health (*see* Analysis 22.6); and in the numbers who fell at least once during the intervention period (*see* Analysis 22.7).

Two deaths, one in each group, were reported (*see* Analysis 22.8).

Secondary outcomes

There were no statistically significant differences between the two groups in various objective measures of strength (*see* Analysis 22.9). At the end of the trial period, 27% of those assessed in the exercises group were doing the exercises fewer than three times weekly. This includes 19% who had given up completely. There was no monitoring of the use of home-based exercises in the control group.

Home-based weight-bearing versus non-weight-bearing exercise programmes

Primary outcomes

There were no statistically significant differences between participants of the two exercise groups in various measures of mobility (*see* Analysis 23.1), physical performance (*see* Analysis 23.2), gait parameters (*see* Analysis 23.3) or in measures of functional performance (*see* Analysis 23.4). There were no statistically significant differences between the two groups in various objective measures of balance, with the exception of functional reach which was better in the weight-bearing group (mean difference 4.90 cm, 95% CI 0.87 to 8.93 cm) (*see* Analysis 23.5). The general lack of statistically significant differences applied also to subjective ratings of pain, perceived risk of falls, balance, sleep quality and general health (*see* Analysis 23.6); and in the numbers who fell at least once during the intervention period (*see* Analysis 23.7).

Four deaths (three versus one) were reported (*see* Analysis 23.8).

Secondary outcomes

There were no statistically significant differences between the two exercise groups in various objective measures of strength (*see* Analysis 23.9). Though the differences (*see* Analysis 23.10) did not reach statistical significance, only participants of the weight-bearing exercises group reported difficulty doing the exercises (6/35 versus 0/37) and more experienced pain during these (10/35 versus 5/37) at the end of the trial period. Similar numbers in the two groups considered the exercises were not useful (10/35 versus 9/37); this is perhaps reflected in the similar numbers that were doing the exercises fewer than three times weekly (11/35 versus 10/37), including those not doing them at all (7/35 versus 7/37).

One month of home-based weight-bearing exercises started seven months after hip fracture versus usual care (no specific instructions)

Sherrington 1997 made this comparison in 44 people, who had been discharged from hospital to home or residential care at an average of seven months after their hip fracture. The data for four participants, two of whom withdrew consent and two others who were excluded because of poor mental or physical health respectively, were not provided. Trial participants were assessed at one month, on completion of the trial intervention.

Primary outcomes

At follow-up, there were no statistically significant differences between the two groups in the ability to weight bear unassisted nor in two measures of gait (velocity and cadence); *see* Analysis 24.1 and Analysis 24.2. There were no statistically significant differences between the two groups in subjective ratings of balance and fall risk (*see* Analysis 24.3) nor in the objective measures of postural control (*see* Analysis 24.4). Fall data were not collected by Sherrington 1997.

No deaths were reported. One person in the control group was unable to complete all the physical tests at follow-up because of pain due to a fall, later diagnosed as a further fracture.

Secondary outcomes

Quadriceps strength was significantly greater in the intervention group (fractured leg: MD 3.10 kg, 95% CI 0.41 to 5.79; *see* Analysis 24.5). The mean number of days of exercise was 24.7 days (range 18 to 30 days) in the intervention group. The control group participants were not asked whether they performed similar exercises. Two people in the intervention group participated in gentle exercise class/activities and one in the control group attended a hydrotherapy class.

There was no mention of costs in Sherrington 1997. However, the stepping blocks, comprising telephone books wrapped in packing tape, used in the intervention group were inexpensive and all intervention participants chose to keep these after the completion of the trial.

DISCUSSION

Summary of main results

Our review covers mobilisation strategies implemented at any stage up to one year during rehabilitation after hip fracture surgery. The evidence from randomised and quasi-randomised trials now comprises that from 19 small trials. In some trials, methodological flaws undermined the validity of their findings. These trials involved a total of 1589 participants; most of whom were female and aged over 65 years. No data pooling was performed given the differences in the trials, primarily in their interventions and settings.

Brief summaries of the findings for the individual comparisons are given below; more extensive commentaries can be found in Table 1.

Table 1. Commentary on individual comparisons

Study ID	Commentary on comparison
	Early post-operative rehabilitation: Timing of mobilisation or weight bearing
Oldmeadow 2006	*Early assisted ambulation (within 48 hours) versus delayed assisted ambulation after surgery (fixation or hemiarthroplasty)* Over one third of the participants allocated early ambulation in Oldmeadow 2006 did not start within 48 hours. Nonetheless, data were provided to perform intention-to-treat analysis. However, a limitation of this trial was that mobility outcome data were only provided at seven days and that participants were only followed-up to discharge from the acute ward. Additionally, as well as incomplete data for continuous outcomes, there were incomplete results for mobility outcomes of transfers and negotiating steps in terms of requiring assistance or inability to perform even with assistance. Hence, caution is required in the interpretation of the results favouring the early mobilisation group in terms of transfers and walking distance, especially in the context of the significantly greater number of participants of this group who were unable to negotiate a step at all or without assistance. While a few more early ambulation group participants were discharged home, the length of hospital stay was also greater for this group; neither of these results reached statistical significance. Oldmeadow 2006 referred to the current practice in their hospital of prescribing bedrest "in the presence of cardiovascular challenge" and it is noteworthy that seven of the 10 participants of the early ambulation group who started after 48 hours were tested for troponin. This perhaps points to some consideration of additional assessment of patients before early ambulation and adjustment to the inclusion criteria of any future trial evaluating early ambulation.
Graham 1968	*Weight bearing at two weeks versus 12 weeks after internal fixation of a displaced intracapsular fracture* The one included trial (Graham 1968) used a method of internal fixation (sliding nail plate) that is generally no longer used to treat this fracture. Additionally, current recommended practice is to mobilise patients as soon as practical after surgery, and lessen the risk of the complications of immobilisation such as thrombosis and pressure damage (SIGN 2002). Thus it is difficult to see how the results of this study comparing weight bearing at two versus 12 weeks could be translated to current practice. Despite the limited findings for Graham 1968 of no difference in unfavourable outcome, including mortality and non-union, this trial is at high risk of bias including incomplete ascertainment of outcome and thus clinically important differences cannot be ruled out.
	Early post-operative rehabilitation: Intensive physiotherapy regimen
Karumo 1977 Lauridsen 2002	*Twice daily physiotherapy versus standard regimen of once daily physiotherapy:* Karumo 1977 *Intensive physiotherapy comprising six hours of physiotherapy per week versus standard physiotherapy of 15 to 30 minutes each weekday:* Lauridsen 2002 In practice, routine or standard physiotherapy is not a fixed item and there is considerably variety, for instance in the timing, extent and nature of the physiotherapy. This is illustrated by the differences between the two trials in this category, both of which aimed to investigate an intensification of physiotherapy. It is noteworthy that the routine regimen of 30 minutes physiotherapy each day for the control group of Karumo 1977 would be considered by some to be more than the standard for many patients after a hip fracture. The control group of Lauridsen 2002 were scheduled for 15 to 30 minutes physiotherapy each week day and had a median of 12 minutes per day. Karumo 1977 may have been seriously compromised by poor methodology, including the exclusion of the results of 13 trial participants with incomplete follow-up: it is certain that some of these had died and others may have had other adverse outcomes. Karumo 1977 also had inadequate follow-up

Table 1. Commentary on individual comparisons (*Continued*)

	and failed to present comprehensive quantitative results to enable confirmation of their conclusions, namely of the similarity in outcome of the two groups and thus the lack of evidence of a benefit from a more intensive physiotherapy regimen. Follow-up in Lauridsen 2002 was only until hospital discharge. Nearly half of the participants withdrew from Lauridsen 2002 and did not complete the training programme; significantly more drop-outs were in the intensive group. The main message from this trial is that the particular intensification regimen on offer, comprising two hours of physiotherapy on Monday, Wednesday and Friday, was beyond the capacity of some patients and rarely taken up to the full amount even in those patients who had completed training.
	Early post-operative rehabilitation: Weight-bearing exercises
Sherrington 2003	*Two-week programme of weight-bearing exercise versus non-weight-bearing exercise* It cannot be assumed that the improvement in mobility found in the weight-bearing exercise group of Sherrington 2003 persisted after the end of the two-week exercises programmes. As suggested in Sherrington 2003, a programme comprising a combination of weight-bearing and non-weight-bearing exercises is also not ruled out.
	Early post-operative rehabilitation: Quadriceps training programme
Mitchell 2001	*Quadriceps muscle strengthening regimen for six weeks versus conventional physiotherapy alone* The absence of data from 45% of the randomised participants at final follow-up of Mitchell 2001 means that the reports of better mobility scores, functional reach, Barthel scores and enhanced muscle strength must be considered provisional. Moreover, the clinical implications of these results are not established. However, the between-group differences found do suggest that this intervention warrants further investigation in studies of more rigorous design.
	Early post-operative rehabilitation: Treadmill gait retraining programme
Baker 1991	*Treadmill gait retraining programme versus conventional gait retraining* It is not possible to draw any conclusions on overall effect of treadmill gait training compared with conventional gait training from the limited and potentially biased findings of Baker 1991. Given the potential for, and potential use of, treadmill training to enhance the recovery of mobility of hip fracture patients, further research seems merited. However, one excluded trial that set out to do this seems to have been abandoned (Giangregorio 2005)
	Early post-operative rehabilitation: Electrical stimulation of the quadriceps
Braid 2008 Lamb 2002	*Six-week programme of electrical stimulation of the quadriceps muscle (18 minute-long sessions) versus no electrical stimulation:* Braid 2008 *Six-week programme of electrical stimulation of the quadriceps for three hours daily versus placebo stimulation:* Lamb 2002 The two trials testing electrical stimulation had different approaches and rather different findings. Braid 2008 found no evidence of an effect but noted also poor tolerance of electrical stimulation. In contrast, Lamb 2002 provided some evidence that electrical stimulation improved mobility; and that the effect persisted, even increased, after the end of the six weeks regimen. Lamb 2002 found that electrical stimulation was fairly well tolerated by the trial participants. It is possible that the difference in the findings of the two trials mainly reflects differences in the stimulation regimens: that of Braid 2008 was considerably shorter in duration of exposure. Additionally, Braid 2008 caused

Table 1. Commentary on individual comparisons (*Continued*)

	the maximum quadriceps contraction they could stimulate, whereas Lamb 2002 used an intensity sufficient to cause visible muscle contraction. However, neither trial was sufficiently powered to conclusively establish the effects of electrical stimulation on mobility after hip fracture. Before the inclusion of Braid 2008, we proposed that larger pragmatic studies with longer-term follow-up were needed to establish whether the potential short term gains in mobility "translate into long-term benefits" (Lamb 2002). The low tolerability of electrical stimulation without marked improvement in mobility and function in Braid 2008 points to the possibility that the population that can tolerate electrical stimulation may be restricted to fitter formerly more independent patients.
	Early post-operative rehabilitation: Electrical stimulation (pain alleviation)
Gorodetskyi 2007	*Electrical stimulation versus placebo stimulation* The results for electrical stimulation aimed at alleviating pain and enhancing recovery in Gorodetskyi 2007 are highly favourable in terms of pain, the interference by pain on walking ability, hip flexion and blinded assessment by an orthopaedic surgeon of recovery at 10 days. As noted by the trial authors, the patients were notably younger than in many other populations (mean age 71 years) , functionally independent and none had dementia. Additionally, the follow-up stopped just after the final treatment session and a direct outcome measure of mobility was absent. Thus the impact on mobility is uncertain as is the persistence of the effect in the long term. These point to the need for further research.
	Early post-operative rehabilitation: Resistance training for 12 weeks (with or without nutritional supplementation)
Miller 2006	*Twelve-week programme of resistance training versus resistance training for 12 weeks plus nutritional supplementation for six weeks versus attention control starting seven days post injury* Miller 2006 found no significant differences between the three intervention groups included in this review at the end of the 12 weeks intervention period in mobility or functional outcomes; nor at one year for mortality, hospital readmission or transfer to a higher level of care. This was a small trial, with some incomplete reporting, which included several frail older people with lower-limb fractures other than hip fracture. An ongoing trial (INTERACTIVE) evaluating a combined exercise and nutrition intervention in hip fracture alone should help to inform this area.
	Early post-operative rehabilitation: Weight-bearing exercise for 16 weeks
Moseley 2009	*Weight-bearing exercise twice daily for 60 minutes per day for 16 weeks versus usual care (mainly non-weight bearing exercise for 30 minutes per day)* Our critical appraisal of Moseley 2009 confirms their conclusions that "there was no benefit (or harm) due to the higher dose, weight-bearing exercise programme with respect to the primary outcome measures." This was a well-conducted and reported trial but, particularly, lack of care provider blinding may have affected the trial conduct. The trialists speculated that one reason for the lack of differences between the two treatment groups was that the therapists may have modified the programme for participants in the control group. A longer follow-up, outside the treatment period would have been desirable. While the trialists reported greater benefit for participants with cognitive impairment (with family carer available), as acknowledged, the subgroup analyses conducted by the trial were *ad hoc*.
	Continuation or community rehabilitation: Early post-discharge rehabilitation

Table 1. Commentary on individual comparisons (*Continued*)

Hauer 2002	*Twelve weeks of intensive physical training versus placebo motor activity starting about four to five weeks after surgery upon discharge from inpatient rehabilitation* Participants who adhered to the intensive training programme in Hauer 2002 had superior mobility and functional motor performance, muscle strength, and fewer fall-related behavioural problems. Though the level of physical activity in the intensive training group dropped to almost baseline levels three months after the cessation of training, there was some persistence in the improvements in muscle strength and some other variables in this group. Only minor adverse effects were reported and there were none that could not be resolved. Thus, this well-conducted trial provides some reasonable evidence of the potential benefits of intensive physical training after hospital discharge. There are, however, some aspects of the trial that caution against drawing these conclusions. Firstly, the trial is small and the results of four participants (14% of the trial population) are not available. Secondly, the control group received no strength and balance training at all; this was excluded from the routine physiotherapy provided to both groups. Thus, the question tested by the trial could be interpreted as whether strength and balance training is effective rather than whether intensive physical training is effective. Furthermore, though the choice by Hauer 2002 to remove the strength and balance training from the routine physiotherapy is an understandable one, it does give problems regarding applicability to other settings where strength and balance training are part of the routinely-provided physiotherapy for such patients. The provision of transport to attend training sessions seemed to have paid dividends in terms of adherence in this trial and perhaps should be taken on board as a general principle. Persistence or otherwise of training effects is a question that hangs over some of the other trials included in this review. Hauer 2002 gave some evidence of an often diminished but still persisting effect after three months. The real implications of this, in terms of actually mobility, quality of life and sustained functional independence in people aged 75 years or older who are already fairly frail and mainly sedentary, cannot be assessed here from the small sample available. The finding that the increased level of physical activity during the intensive training period did not persist after training ended supports Hauer 2002's call for a continuing intervention but the nature of this is not established by this trial.
	Continuation or community rehabilitation: Early post-discharge rehabilitation
Tsauo 2005	*Three months, delivered in eight visits, of home-based individualised physical therapy versus unsupervised home exercise on discharge from an acute ward* The findings of an earlier improvement in quality of life and functional ability from home-based physical therapy by Tsauo 2005 are plausible but should be interpreted with caution given the exclusion of data from a large proportion (54%) of participants. Notably, four people were excluded for poor compliance with the intervention and two people in the intervention group had a refracture. The special context of this small study, conducted in Taiwan, also merits consideration in terms of the applicability of trial findings. For instance, there is no reimbursement in the insurance system for home-based physiotherapy after hospital discharge.
	Continuation or community rehabilitation: Rehabilitation after completion of standard physical therapy
Resnick 2007	*Twelve month programme of trainer-led exercise sessions with or without motivational interventions versus usual care (no intervention) after completion of standard rehabilitation* The primary focus of Resnick 2007 was on psychological/behavioural outcomes of self-efficacy and expectations, and the only mobility outcomes relevant to this review related to activity levels. Data provided for the exercises only group confirmed that activity levels were greater than in the control

Table 1. Commentary on individual comparisons (*Continued*)

	group. Yet, this was reported as not being the case for exercises group that included a motivational intervention. The stipulation that no encouragement should be given in the exercises group is interesting in that encouragement is probably a de facto part of most rehabilitation interventions. Resnick 2007 was judged to have a high risk of bias performance bias. In part this resulted from the large variation (28 to 200 days) in the time from fracture to the first intervention visit from trainer. This was timing was determined by the participants, and points to a problem of pragmatic trials of this type. A related issue was the poor acceptability of the interventions, where 35% and 29% of the two exercise intervention groups were not willing to have any intervention visits, and adherence, where the mean numbers of visits were under half of the maximum visits scheduled over one year.
	Continuation or community rehabilitation: Rehabilitation after completion of standard physical therapy
Binder 2004	*Six months of supervised intensive outpatient physical therapy and exercise training versus low-intensity home exercise after completion of standard therapy* The intervention provided in Binder 2004 was very intensive (three times weekly) and highly supervised (2 to 5 participants per instructor for the first three months) and longer lasting (six months) than the other programmes evaluated in the included trials. Binder 2004 found the largest effect for an intervention programme with clinically important between-group differences for most key variables. Of particular note is the effect on more global measures (e.g. SF-36 Physical Function subscale score mean difference 11.00, 95% CI 0.42 to 21.58). This trial shows that is it possible to enhance physical outcome after hip fracture by an intensive intervention. It does not show whether these improvements persist after the end of rehabilitation (follow up was only up to the end of the intervention) or whether the risk of decline and nursing home placement was averted in the target group of patients. Binder 2004 did not collect detailed costs of their intervention and acknowledged that it was unclear whether the cost of the 72 treatment sessions would be reimbursed in the USA. Further investigation is required to assess whether these gains could also be achieved with a less resource intensive programme.
	Continuation or community rehabilitation: Rehabilitation started soon after completion of standard physical therapy
Mangione 2005	*Twelve weeks of supervised home-based moderate to high intensity resistance training versus aerobic exercise training versus education control group after completion of usual physical therapy* This three-group small trial (Mangione 2005) is unlikely to have had sufficient power to detect between-group differences. The interventions tested are of a higher intensity than those in most of the other trials in this review. The modification of resistance training equipment for use at home is interesting as many people after hip fracture may prefer to exercise at home rather than attending a centre. From the high reports of adherence, the intervention appears to have been well-tolerated by participants although the fact that six of the 17 resistance training participants dropped out of the study (compared with one from each of the other two groups) may indicate a higher rate of dissatisfaction or complications in this group. It could also reflect that the participants were unaccustomed to exercising at such a high intensity. Mangione 2005 is especially compromised by the large variation in the start time of participation in the study, and particularly that the control group participants started on average seven weeks earlier than participants of the two intervention groups. Moreover, the depression scores of the control group were significantly higher.
	Continuation or community rehabilitation: Later stage home-based rehabilitation

Table 1. Commentary on individual comparisons (*Continued*)

Sherrington 2004	*Four months of home-based weight-bearing exercises versus home-based non-weight-bearing exercises (performed in the supine position) versus no specific instructions started 22 weeks after hip fracture* Based on measures of improvement from baseline assessment rather than final outcome measures, Sherrington 2004 concluded that "a weight-bearing home exercise program can improve balance and functional ability to a greater extent than a non-weight bearing program or no intervention among older people who have completed usual care after a fall-related hip fracture." These conclusions are not supported by the analyses of the post-intervention assessments presented in this review. Though the majority of both objective and subjective outcome measures show no statistically significant differences for any of the four comparisons, the consistency of the results for mobility, functional, strength and balance outcomes gives some indication of possible benefit of a home-based exercise programme, whether weight-bearing or non-weight-bearing. However, the loss to follow-up, the short-term follow up and the lack of assessor blinding could distort these findings and it is notable that over a quarter of those in the two exercise groups who were assessed considered that the exercises were not even of moderate usefulness. Differences between weight-bearing and non-weight-bearing exercise groups at post-test were also not statistically significant. It is noteworthy that the weight-bearing exercises, which involve exercises that are more relevant to activities of daily life, did not appear to enhance physical performance and, while not evidently associated with a greater risk of falling, were judged as more difficult and painful to do by participants. However, this comparison, like the others, is underpowered and more evidence is required to establish the benefits or otherwise of home-based exercises and whether an emphasis on weight-bearing exercises is appropriate. A comparison of weight-bearing exercises versus either non-weight-bearing exercises or no exercises was considered, based on the clinical impression of the lead investigator (Sherrington 2004a) of this trial that non-weight-bearing exercises were relatively ineffectual. Due to the aforementioned concern of bias arising from a potential conflict of interest, this comparison has been placed in reserve until the inclusion of another trial testing a similar comparison in this setting.
	Continuation or community rehabilitation: Later stage home-based rehabilitation
Sherrington 1997	*One month of home-based weight-bearing exercises started seven months after hip fracture versus usual care (no specific instructions)* Sherrington 1997 was another too small study, further compromised by a lack of masking of allocation and of outcome assessment, and a short follow-up. The only statistically significant finding was in the greater quadriceps strength of the intervention group; this may have reflected the higher proportion of males in this group. Though compliance in the intervention group was good, there was insufficient monitoring, especially of falls, to confirm that the intervention was safe.

Early post-operative rehabilitation

Twelve trials evaluated mobilisation strategies started soon after hip fracture surgery.

Oldmeadow 2006 produced contradictory short-term results for early ambulation started within 48 hours of surgery. While participants in the early ambulation group walked twice as far at seven days, significantly greater numbers in this group were unable to negotiate one step without assistance. Moreover, over a third of participants allocated early ambulation started after the 48 hours target.

Graham 1968 found no significant differences in unfavourable outcomes for weight bearing started at two versus 12 weeks after internal fixation of a displaced intracapsular fracture.

Two trials compared a more with a less intensive regimen of physiotherapy: Karumo 1977 found no difference in recovery between the two groups, while Lauridsen 2002 found a higher level of drop-

out in the more intensive group with no difference in length of hospital stay.

Sherrington 2003 found short-term improvement in mobility and balance for a two-week programme of weight-bearing versus non-weight-bearing exercise.

Mitchell 2001 found improved mobility in those given a quadriceps muscle strengthening exercise programme compared with those receiving conventional physiotherapy alone.

Baker 1991 found no significant difference in recovery of mobility after a treadmill versus conventional gait retraining programme.

The two trials testing electrical stimulation of the quadriceps had different approaches and rather different findings. Braid 2008 found no evidence of an effect (compared with no stimulation) but noted also poor tolerance of electrical stimulation. In contrast, Lamb 2002 found a greater recovery of pre-fracture mobility for electrical stimulation (compared with placebo stimulation), which was fairly well tolerated by the trial participants.

Gorodetskyi 2007 found very favourable results at 10 days for electrical stimulation (compared with placebo stimulation) primarily aimed at alleviating pain.

Miller 2006 found no significant differences between the 12 week programme of resistance training versus resistance training for 12 weeks plus nutritional supplementation for six weeks versus attention control.

Moseley 2009 found no significant differences in mobility from 16 weeks of weight-bearing exercise compared with the usual exercise regimen.

Continuation or community rehabilitation

Seven trials evaluated strategies started after hospital discharge. Started soon after discharge, Hauer 2002 and Tsauo 2005 respectively found improved outcome after 12 weeks of intensive physical training (compared with placebo motor activities) and a home-based physical therapy programme (compared with unsupervised home exercises).

The interventions of five trials began soon after completion of standard physical therapy or usual care, hence the control groups usually received no or a low intensity intervention. Resnick 2007 found increased activity levels after a one year programme of trainer-led exercises only but not when these exercises were supplemented with coaching. Binder 2004 found improved outcome after six months of intensive physical training whereas Mangione 2005 found no significant effects of 12 weeks of home-based resistance or aerobic training. Sherrington 2004 found improved outcome after home-based exercises started around 22 weeks from injury. Sherrington 1997 found home-based weight-bearing exercises starting at seven months produced no statistically significant differences aside from greater quadriceps strength.

Overall completeness and applicability of evidence

To inform consideration of applicability of the evidence from individual trials, we have increased the details given in the Characteristics of included studies on the study populations and interventions. Additionally, Table 2 shows our assessments for each trial of five aspects of relevance to ascertaining external validity: definition of the study population, description of the interventions, definition of primary outcome measures, length of follow-up, assessment of compliance. Clearly unhelpful is where there are incomplete descriptions of study inclusion (two trials), interventions (four trials) or outcomes (three trials). The timing of outcome measurement was considered suboptimal in 16 trials, and especially in those where participants were followed-up to either hospital discharge or only until the end of the intervention. Some assessment of compliance with allocated interventions or control interventions was reported in seven trials, but seven other trials which reported compliance only did so for the active intervention group(s).

Table 2. Assessment of items relating to applicability of trial findings

	Clearly defined study population?	Interventions sufficiently described?	Main outcomes sufficiently described?	Appropriate timing of outcome measurement? (Yes = ≥ 6 months)	Assessment of compliance with interventions
Baker 1991	Yes	Partial: frequency and intensity of gait retraining not described	Yes	No: only followed up until discharge: mean stay in rehabilitation hospital for intervention group was 54 days.	No: although mention of treadmill participants aiming to exceed previous performance on the treadmill

Table 2. Assessment of items relating to applicability of trial findings (*Continued*)

Binder 2004	Yes	Yes	Yes	Partial: although 6 months follow-up, it was only until the end of the intervention.	Yes: in both groups
Braid 2008	Yes	Partial: usual post-discharge physiotherapy not described	Yes	Partial: 14 weeks. Intervention ended after 6 weeks.	Partial: compliance and tolerance to electrical stimulation only reported for intervention group
Gorodetskyi 2007	Yes	Yes	Yes (although limited)	No: 10 days marking end of treatment.	Yes: it is stated that intervention was received by all patients
Graham 1968	Partial: inadequate description; excluded post-randomisation if unsuitable to walk at 2 weeks	Partial: little description of rehabilitation	Partial: no record of mobility outcomes	Yes: 1 year	No
Hauer 2002	Yes	Yes	Partial: however, clarification on some outcome measures was obtained via contact with trial author .	Yes: 6 months (3 months after the end of the intervention) . Two year follow-up results reported for whole study population	Yes: in both groups
Karumo 1977	Partial: no mention of exclusion criteria. Though the inclusion criteria were a displaced femoral neck fracture, the implants used for some participants (9 Jewett nails, 1 Rush nail, 1 Kuntscher nail) suggest that some extracapsular fractures were included.	Yes	Partial: incomplete descriptions	No: 9 weeks only for function. (3 months for mortality.)	No

Table 2. Assessment of items relating to applicability of trial findings (*Continued*)

Lamb 2002	Yes	Yes	Yes	Partial: 13 weeks from surgery.	Yes: "All of the women used their stimulators for more than 75% of the cumulative time requested"
Lauridsen 2002	Yes	Yes	Yes	No: primary outcome = length of training period; otherwise until discharge.	Yes: in terms of the interventions (although not the components)
Mangione 2005	Yes	Yes	Yes	No: 12 weeks for the two intervention groups but 8 weeks only for the control group.	Partial: only compliance to the intervention groups recorded.
Miller 2006	Yes	Yes	Yes	Partial: 12 weeks only for mobility outcomes. One year follow-up data for mortality, readmissions and admission to higher level of care.	Partial: only compliance to the intervention groups recorded.
Mitchell 2001	Yes	Yes: Intervention and standard physiotherapy described.	Yes	Partial: 16 weeks follow-up. Intervention ended at 6 weeks.	Partial: only compliance to intervention recorded.
Moseley 2009	Yes	Yes	Yes	Partial: 16 weeks follow-up.	Yes: "Participants completed exercise diaries which were analysed to ascertain adherence to the programmes." Care provider visits also documented.
Oldmeadow 2006	Yes	Yes	Yes	No: only until acute hospital discharge. Mobility outcomes at 7 days.	Yes: time to first walk recorded in both groups.

Table 2. Assessment of items relating to applicability of trial findings (*Continued*)

Resnick 2007	Yes	Yes	Yes	No: although follow-up was 12 months from fracture, this coincided with the end of treatment	Partial: no data for usual care group.
Sherrington 1997	Yes	Partial: "Usual care" not described.	Yes	No: final assessment at 1 month (27 to 43 days)	Partial: only the intervention group completed diaries and were asked about the specific exercises. However, all participants were asked about general exercise.
Sherrington 2003	Yes	Yes	Yes	No: 2 weeks follow-up only	Partial: some data available but not regarding weight bearing.
Sherrington 2004	Yes	Yes	Yes	Partial: 4 months follow-up only	Partial: compliance data collected for the two exercise groups but not for the control group.
Tsauo 2005	Yes	Yes: intervention was fully described. The control group just received instructions to continue hospital exercises.	Yes	Yes: 6 months follow-up.	No. However, 4 participants in the intervention group were excluded because of poor compliance.

Also, problematic in terms of applicability are the differences in settings, in definitive treatment (such as type of surgery), in health care provision and policy including the extent of support post hospital discharge, and the expectations and social norms of people in different parts of the world. Additionally, the potential for trial findings to be influenced by the 'special' characters of the clinicians providing the care cannot be ruled out.

The characteristics of the study populations are also highly relevant. For instance, it is notable that 13 trials, including all seven post-discharge intervention trials, excluded people with various levels of cognitive impairment. The acceptability and tolerance of interventions by hip fracture patients is also important; and a recurring theme in our commentary on individual comparisons in Table 1. For instance, we suggest that the contrasting results for tolerability of electrical stimulation of the quadriceps in Braid 2008 and Lamb 2002 points to the possibility that the population that can tolerate electrical stimulation may be restricted to fitter formerly more independent patients.

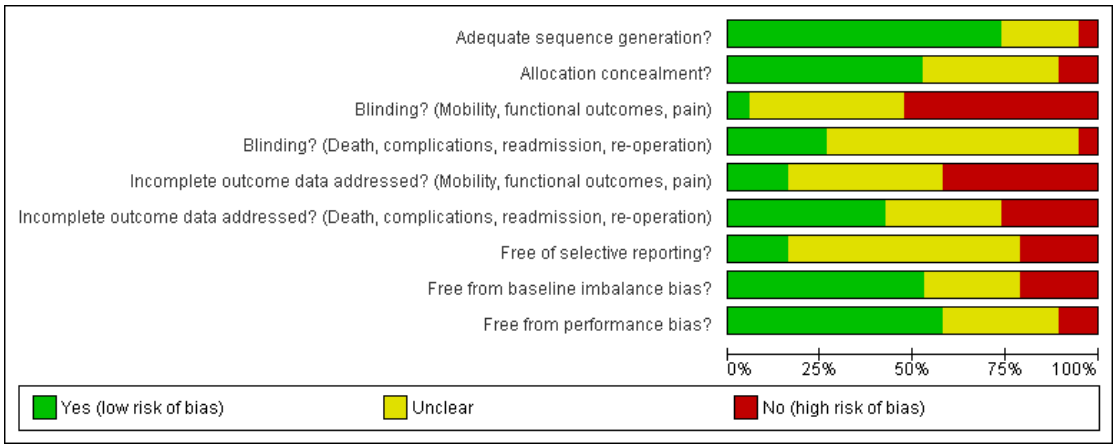
Quality of the evidence

A cautious interpretation of the findings of single trials is necessary.

Trial size is an important consideration and most of the included trials are unlikely to have been sufficiently powered to detect between-group differences for a range of outcome measures, should they exist. The interpretation of results in this review is primarily based on the statistical significance of difference between the intervention and comparison groups after a period of intervention. It is noteworthy that many of the studies indicated between group differences in a range of outcome measures which tended to favour intervention groups but do not reach statistical significance. This is illustrated graphically in the forest plots. Several factors, including the generally large variation in baseline characteristics and outcome of patients with hip fracture and the effects of the natural recovery process over time, increase the numbers needed in these trials for the detection of statistically significant differences between intervention approaches.

There is a strong possibility of biased results resulting from methodological weaknesses of several trials. Thirteen trials were judged at high risk of bias on at least one aspect, more frequently a lack of blinding (*see* Figure 1). Incomplete outcome data, or failure to address this adequately, was also a common source of bias (*see* Figure 2). One frequent inadequacy of the trials was the short-term nature of the outcome assessment. In particular, the follow up of trial participants only up to the end of the intervention, while administratively convenient, could give misleading results; and the question of whether the effect of the intervention persists in the longer term remains unanswered.

Figure 2. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.



One key reason for the scarcity of trials may be because the evaluation of rehabilitation interventions is difficult to do well. These are generally complex interventions with considerable variation in practice including the often adaptive nature of rehabilitation, where treatment is varied according to the perceived needs and progress of individual patients. Some aspects of trial methodology, notably concealment of allocation, are always possible but others, such as blinding, are more of a challenge for these trials. In particular, blinding of participants is not possible in trials of many physical interventions such as exercise. Blinding of outcome assessors is possible for tests of mobility but not for self-reported outcomes where the participant is effectively the outcome assessor.

Potential biases in the review process

Our search for trials was comprehensive but it is likely that we have missed some; perhaps more likely in this update because we did not search conference proceedings. However, the growing momentum of trial registration may help reduce the risk of publication bias in future and we note that some trials do get published eventually. The inclusion of Braid 2008, which we had excluded in the previous version, is a case in point and noteworthy too in that its findings differed from those of the previously included trial testing electrostimulation (Lamb 2002).

While we consider that we have included and excluded trials appropriately, the variety and complexity of trial interventions encountered in the eligible trials sometimes made it hard to make this decision. Indeed, we have sometimes gone quite far with processing trials that we subsequently realised were not suitable. These have required us to reconsider and clarify our inclusion criteria, such as setting a limit on the time for starting the intervention at one year. We have also excluded trials such as Allegrante 2001 and

Tinetti 1999 that tested multifactorial interventions, and other trials that primarily focused on elective hip surgery. The reason for excluding the first category is that it is not possible to separate out the effects of the mobilisation component of multifactorial interventions. Although the aim of these trials is to restore or augment function, we have kept our focus on mobilisation and mobility. These latter remain key objectives for people after hip fracture surgery. The exclusion of trials focusing on elective hip replacement surgery reflects that these populations are likely to differ in important ways to the generally older and frailer populations sustaining a hip fracture.

Various choices have arisen in the compilation of the analyses of this review. Generally, the results at final follow-up rather than 'change scores' (change from baseline) have been presented. This can result in a disparity between the results presented here for individual trials and their trial reports. Though disconcerting, we opted for a consistent approach in the review and these disparities perhaps more underline that these are small trials where randomisation is unlikely to achieve populations that are comparable in all key characteristics.

We decided meta-analysis was inappropriate because of the differences in the included trials in terms of trial participants, settings, interventions, or a combination of these. Additionally, it was clear that the variation in the outcome measures of different trials would generally have precluded data pooling but the use of standardised mean differences can be valuable in this situation. Noting that the comparisons tested by the included trials are consistent with a general comparison of more intensive versus less intensive intervention, we considered whether it would be appropriate to set up meta-analyses for the two established rehabilitation stages (early (inpatient), continuation (community)) to examine the broad question of whether the provision of more intensive therapy, in whatever form, would improve mobility in a way that was safe and acceptable to patients. As indicated, the disparity in outcome measures and measurement would have severely restricted data pooling but there is also the difficulties of interpretation of the findings of these meta-analyses as they only address the main question and thus will not inform readily the choice of intervention. Arguably, the pooling of data for different measures of mobility from the results of the various exercise-based programmes featured in this review can still be of value from the more general perspective of informing of health funders and managers. As in Sherrington 2008, meta-regression can then be used to explore heterogeneity and thus attempt to identify key differences in the trials, including interventions and timing, that might affect outcome. The limitations in the currently available data remain, however.

Lastly, this review presented another dilemma resulting from one of the authors (Catherine Sherrington) being the lead investigator of three trials (Sherrington 1997; Sherrington 2003; Sherrington 2004), and an investigator on Moseley 2009. We considered it was important that all processing of these trials was carried out independently of Sherrington. While this avoided conflict of interest, it may have downplayed the potential advantages of Sherrington's insights on the results of her trials.

AUTHORS' CONCLUSIONS

Implications for practice

There is insufficient evidence from randomised trials to determine the effects of any particular mobilisation strategy or programme started either in the early or later rehabilitation period after hip fracture surgery. However, the included trials generally indicate that it is possible to enhance mobility after hip fracture though the optimal method to achieve this remains unclear. While the most successful programmes evaluated to date have involved intensive supervised ongoing exercise, the optimal format and resource implications for these strategies are not established.

Clearly, intervention is required to restore and enhance mobilisation in older people after surgery for hip fracture. The interventions chosen should match the needs of individual patients and be based on agreed local practice guidelines. Such guidelines, which should acknowledge and allow for the insufficiency of the underlying evidence to inform practice, should also include consideration of the continued risk of further falls and fractures and potential for functional decline in this often frail patient population.

Implications for research

The presence of ongoing trials points to the importance of maintaining this review, but further primary research in the form of sufficiently powered, preferably multi-centred, high quality randomised controlled trials is also required to inform practice. Such research should focus on interventions that are likely to have a beneficial overall, long-term impact; thus, trials should have long-term (one year or more) and comprehensive follow up including the collection of validated and patient-orientated outcome measures, and economic outcomes. Given the investment required for such trials, priority questions and areas need to be identified. We consider that this needs to be opened up for a general debate but some clues can be gained from this review and the following considerations.

This review already gives some indication of the variety of questions that clinicians consider important and have, we assume, successfully justified to ethics committees and, often, to funders. With some exceptions, such as Graham 1968 which is not relevant to current practice, the questions evaluated incompletely by these trials remain pertinent. Some can be considered as pilot studies and after appropriate adjustments, such as to the study design and perhaps to the interventions, a potentially useful trial will emerge.

It is debatable whether future research priorities should be on the evaluation of multi-facetted or multi-component interventions (excluded from this review when not solely aimed at mobilisation) with mobilisation components, rather than mobilisation interventions or programmes by themselves. This is particularly relevant to rehabilitation after discharge from hospital, which is an increasingly important area. Lessons from the literature on fall prevention (Gillespie 2009) and strength training (Liu 2009) in older people may be applicable here as well as generally to rehabilitation after hip fracture surgery. We consider, however, that it is still useful to investigate mobilisation strategies in themselves, particularly as these will form a substantive part of any rehabilitation intervention for this patient group.

Some consideration of these trials must be given to the differences in the physical and mental capacities of people with hip fracture. Different interventions may be suitable for different subgroups of hip fracture patients: for instance, the more frail versus more physically able. Thus, trials could also investigate whether differing responses to interventions occur among different subgroups of hip fracture patients. Of course such investigations should take into account methodological concerns about excessive subgroup analyses in clinical trials and pre-specify subgroups and use appropriate statistical techniques (Sun 2010).

Development of a standard portfolio of validated and patient-orientated outcome measures for trials would enable meta-analysis of the results of future trials.

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* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

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

Baker 1991

Methods	Quasi-randomised trial: by alternation; patients were allocated "sight unseen"
Participants	Caulfield Hospital, Victoria, Australia Period of study: started 12/05/1985 40 participants Inclusion: women with a hip fracture Exclusion: rheumatoid arthritis, active cardiac disease, neurological condition that would influence gait pattern Age: mean 83.5 years (range 69 to 97 years) % male: none Number lost to follow-up: probably none, although 1 died.
Interventions	Early post-operative rehabilitation 1. Treadmill gait retraining programme. Use of Repco treadmill with velocity and distance controls. Adjustable side rails for partial weight-bearing stage. versus 2. Conventional gait retraining involving use of ambulatory aid (walking frame) Both groups had participated in the same muscle strengthening programme beforehand. Other aspects of physical therapy was reported to be similar.
Outcomes	Length of follow-up: until discharge from rehabilitation hospital Mobility level at discharge (3 levels: house bound; limited outdoor activity; outdoor activity unlimited by symptoms) Walking velocity Stride length Gait analysis Return to living at home Length of hospital stay Mortality (in hospital)
Notes	A subgroup of 6 'matched pairs' were studied in greater detail by gait analysis.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	No	Quasi-randomised trial involving alternation: "the first patient was allocated to the treadmill group, the second to the control group, and so on".
Allocation concealment?	No	Predictable sequence even though researcher apparently "allocated patient 'sight unseen"'

Baker 1991 (*Continued*)

Blinding? Mobility, functional outcomes, pain	No	There was no mention of blinding.
Blinding? Death, complications, readmission, re-operation	Unclear	Not blinded but unlikely to affect assessment.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	No	Measure of mobility assessment was crude. Gait analysis was reported for six matched pairs: this decision was not explained fully.
Incomplete outcome data addressed? Death, complications, readmission, re-operation	No	The group allocations for the only death and the 5 other participants requiring nursing home or special accommodation were not given.
Free of selective reporting?	No	The reason for reporting gait analysis outcomes for six matched pairs was not provided.
Free from baseline imbalance bias?	Unclear	Insufficient information.
Free from performance bias?	Yes	Explicit mention of comparability.

Binder 2004

Methods	Randomised trial: use of a computer generated algorithm and block design, stratified by type of surgery (hemiarthroplasty or internal fixation)
Participants	Community-dwellers, St Louis, Missouri, USA Period of study: August 1998 to May 2003. 90 participants Inclusion: physically frail people (modified Physical Performance Test score of 12 to 28 and ADL difficulty) aged 65 years or over with a surgically-repaired proximal femoral fracture in the previous 16 weeks who had completed standard physical therapy. Informed consent. Exclusion: pathological fracture, contralateral hip fracture, dementia or cognitive impairment, inability to walk 50 feet, visual or hearing impairments interfering with participation, other major medical conditions (cardiopulmonary or neuromuscular disease) , taking medication for osteoporosis, on hormone replacement therapy, terminally ill. Age: mean 80 years (range not given) % male: 26 Number lost to follow-up: 5 (2 due to personal reasons, 2 due to medical problems, 1 died)
Interventions	Continuation or community rehabilitation started after end of standard physical therapy. 1. Six months of supervised exercise carried out three times weekly. For the first three months, small group (2 to 5 participants) progressive exercise for flexibility, balance,

Binder 2004 (*Continued*)

	coordination, movement speed, strength and endurance led by a physical therapist. After the first three months, progressive resistance training was added (progressed by end of one month to 3 sets of 8 to 12 repetitions at 85% to 100% of initial 1-RM voluntary strength (see Footnotes)). versus 2. Low intensity non-progressive home exercise programme carried out three times weekly after a one-hour training session, plus monthly group sessions and weekly 10 minute telephone calls. Additional interventions for both groups: monitoring and instruction by dietitian if indicated, and vitamin D if indicated at baseline. All received calcium and multi-vitamins tablets.
Outcomes	Length of follow-up: 6 months Physical Performance Test score (modified Functional Status Questionnaire Score Instrumental Activities of Daily Living Score Basic Activities of Daily Living Score Use of assistive gait devices Knee extension strength Fast walking speed Single limb stance time Berg Balance Score (Total fat-free mass) (Bone mineral density) Short-Form SF-36 (health, physical function, social subscales) Hip Rating Questionnaire Adherence Adverse events and subsequent fractures Mortality
Notes	Host 2007 reported data only from intervention group participants (31/46 participants) who had completed at least 30 sessions in each of the 2 three-month exercise phases.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	"Random assignment ... was performed on completion of the baseline assessments within strata, defined as the types of surgical repair procedure (hemiarthroplasty vs open reduction internal fixation), using a computer generated algorithm and block design."
Allocation concealment?	Unclear	No clear indication of allocation concealment.

Binder 2004 (*Continued*)

Blinding? Mobility, functional outcomes, pain	Unclear	There was blinding of outcome assessors: "the research staff who conducted the assessments were not involved in exercise training and were blinded to group assignment". However, blinding for subjective outcomes was clearly not possible.
Blinding? Death, complications, readmission, re-operation	Unclear	Described. Unclear because blinding relating to attribution of study related / unrelated causes of medical problems or fractures is uncertain.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	Unclear	Five of the 90 participants were lost to follow-up at 6 months. The last observation for these five participants was carried forward and an intention-to-treat analysis was conducted with data for the whole trial population.
Incomplete outcome data addressed? Death, complications, readmission, re-operation	Yes	Seems to be the case.
Free of selective reporting?	Yes	Pre-trial completion information shows consistent primary outcome.
Free from baseline imbalance bias?	Yes	Comprehensive breakdown of characteristics without significant differences.
Free from performance bias?	Yes	Measures taken to counteract differences in social contact in the control group by weekly phone calls.

Braid 2008

Methods	Randomised controlled trial.
Participants	Two rehabilitation units at two hospitals (Glasgow Royal Infirmary and Hairmyres Hospital), UK Period of study: 01/11/1999 to 01/11/2000 26 participants Inclusion: people aged ≥65 years with hip fracture treated surgically (all internal fixation) up to 21 days previously, written informed consent. Exclusion: terminal disease, abbreviated mental score < 7/10, previous inability to walk, profoundly deaf, cardiac pacemaker, unstable medical conditions (e.g. pneumonia, heart failure). Age: mean 81 years (range not stated) % male: 8%

Braid 2008 (*Continued*)

	Number lost to follow-up: 3 refusals + 2 deaths; also 2 telephone follow-up only.
Interventions	Post-operative rehabilitation 1. Supplementary electrical stimulation (ES) of quadriceps for 6 weeks: 5 days / week for inpatients; twice a week upon discharge. ES consisted of 7 seconds of stimulation of quadriceps followed by 23 seconds of relaxation for 36 repetitions; each session lasted 18 minutes. Delivery by physiotherapist assistant. Usual physiotherapy. versus 2. Usual physiotherapy only. Inpatient physiotherapy consisted of supervised strengthening + range of motion exercises, balance training, work on transfers and progressive gait re-education. Expert physiotherapist established optimum electrical stimulation post baseline measurement but prior to randomisation (tolerance levels not provided for control group participants). Intervention started in hospital, baseline measurements at median 10 to 11 days post-surgery, and continued at home after hospital discharge.
Outcomes	Length of follow-up: 14 weeks Elderly Mobility Scale Leg extension power Barthel Index Nottingham Health Profile (gait speed, emotional reactions, energy, pain, physical mobility, sleep, social isolation) Mortality
Notes	Two other outcomes (timed up and go, isometric quadriceps strength) described in trial registration / abstracts but not in full report.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	"Randomisation was by computer-generated random numbers"
Allocation concealment?	Yes	"with individual patient codes held in opaque sealed envelopes by an administrator independent from the study."
Blinding? Mobility, functional outcomes, pain	Unclear	"Measurements were made at baseline, at 6 weeks (the end of intervention) and 14 weeks by a single blinded assessor." However, trial participants were not blinded and this may have been influential.
Blinding? Death, complications, readmission, re-operation	Yes	Only mortality reported.

Braid 2008 (*Continued*)

Incomplete outcome data addressed? Mobility, functional outcomes, pain	Unclear	Although participant flow data provided, loss to follow-up was proportionality greater in the intervention group.
Incomplete outcome data addressed? Death, complications, readmission, re-operation	Yes	Only mortality reported.
Free of selective reporting?	Unclear	Consistent reporting of primary outcomes, but 'timed up and go' and isometric muscle data indicated in abstract and trial registration form are missing.
Free from baseline imbalance bias?	Unclear	"There was a non-significant trend for the control group to have a greater unfractured leg extensor power and higher Barthel scores at study entry." Proportionally fewer intervention group participants had independent mobility at baseline (27% versus 55%).
Free from performance bias?	Unclear	Although participants in both groups received standard physiotherapy while inpatients, it is not clear whether post discharge provision was similar.

Gorodetskyi 2007

Methods	Randomised controlled trial.
Participants	Moscow City Hospital NO71, Moscow, Russia Period of study: February to November 2005 60 participants Inclusion: people aged between 60 and 75 years who had undergone stabilisation (dynamic hip screw or external fixation) of an A2 femoral trochanteric fracture (AO classification). Informed consent. Exclusion: limitations that might interfere with electrical stimulation including insulin pumps, pacemakers and neurostimulation implants; history of epilepsy or seizure; bilateral fractures; pathological fractures (excluding osteoporosis). Age: mean 71 years (range 63 to 75) % male: 33% Number lost to follow-up: 0
Interventions	Post-operative rehabilitation. Electrical stimulation or placebo (sham device) included in the standard rehabilitation started within 24 hours of surgery. Treatments & physiotherapy were carried out each morning and took 20 to 30 minutes to complete. Non-steroidal anti-inflammatory drug (Ketorolac tromethamine) prescribed as needed. 1. Electrical stimulation (ES) for 10 days: use of a hand-held non-invasive interactive neurostimulation device (InterX 5000; Neuro resource Group, Plano, Texas). (Device generates high peak amplitude averaging 17 volts on the skin with a low current of about 6 mA, and a damped biphasic electrical impulses which are delivered to the tissue via a pair of concentric electrodes placed in direct contact with the target area. Device adjusts biphasic stimulus in accordance to the impedance of the underlying

	tissue by varying voltage to maintain constant peak current. Device applied for 20 to 30 minutes with electrodes at three sites close to surgical incision. Also corresponding areas on contralateral side. After adjustment for impedance, intensity increased to produce "comfortable sensation for patient". versus 2. Sham device; same timing. All the patients received standard interdisciplinary postoperative care including routine assessment and daily care by an orthopaedic surgeon supported by a physiotherapist and nurse.
Outcomes	Length of follow-up: 10 days (end of treatment) Pain score (VAS: 0 to 10: worst) 'Pain inventory', effects on pain on walking ability, sleep, mood, and enjoyment of life (1: no interference; 10: absolute interference). Analgesic consumption Surgeon's evaluation of patient's progress at 10 days in terms of improvement: none, minimal, average, substantial, full recovery
Notes	All participants were functionally independent before start of study. Authors refer to reduced life expectancy in Russia.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Unclear	Insufficient information. "Fixed randomisation scheme with sealed envelopes"
Allocation concealment?	Unclear	"Fixed randomisation scheme with sealed envelopes"
Blinding? Mobility, functional outcomes, pain	Unclear	"The therapist who administered treatment was aware of the assignment of the patient to an active or sham device. However, all the assessing surgeons, patients and research personnel involved in determining and recording outcome measurements were blinded to this information. The sham device had an identical appearance and application to the active device with lights, buzzing and beeps, but did not produce interactive neurostimulation." Patient blinding may not be possible if they are familiar with neurostimulation.
Blinding? Death, complications, readmission, re-operation	Unclear	Not reported.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	Yes	No loss to follow-up.

Gorodetskyi 2007 (*Continued*)

Incomplete outcome data addressed? Death, complications, readmission, re-operation	Unclear	Not reported.
Free of selective reporting?	Unclear	Possible but no trial protocol or trial registration available.
Free from baseline imbalance bias?	Yes	Intervention groups appeared well matched.
Free from performance bias?	Yes	Same rehabilitation provided to all.

Graham 1968

Methods	Randomised trial: method not stated; stratified by age of patient
Participants	Western Infirmary, Glasgow, UK Period of study: February 1961 to August 1966 273 participants (but possibility of 604 patients being randomised) Inclusion: people with a displaced intracapsular proximal femoral fracture (Garden type III or IV) treated by closed reduction and internal fixation with a sliding nail plate. Exclusion (post randomisation): Any reason (pulmonary or cardiac complications, deep venous thrombosis, general feebleness, redisplacement of the fracture) at 2 weeks that the patient was not considered fit enough to walk at this time. Age: not stated (within 56 to 95 for the 175 participants followed up for 3 years) % male: not known Number lost to follow-up: disregarding post-randomisation exclusions, 13 with incomplete follow-up and 43 died at 1 year.
Interventions	Early post-operative rehabilitation. Operative treatment consisted of closed fracture reduction and internal fixation with a sliding nail plate. For two weeks after the patients sat out of bed, but standing or walking was not allowed. 1. Early weight bearing at 2 weeks after surgery: unguarded walking versus 2. Delayed weight bearing until 12 weeks after surgery
Outcomes	Length of follow-up: 1 year for all, 3 years for subgroup Mortality Non-union of the fracture (failure) Avascular necrosis (segmental collapse) Infection of the hip
Notes	An interim report for 124 trial participants at 3 months was available in 1964 (Abrami 1964), with a second report in 1968 (Graham 1968) which presented results for 273 participants at one year and results at three years for the 175 participants who had been followed up by then. Data from Abrami 1964 are not presented in the review.
Risk of bias	

Graham 1968 (*Continued*)

Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	According to earliest report: "After operation, but according to the sequence of their admission to hospital, patients in comparable five-year age groups were randomly allocated to either the early or the late weight-bearing groups." (Abrami 1964). But as reported by Graham 1968: "After admission to hospital each patient was allocated, by random selection, to an early or late weight-bearing group within each decade from fifty-six to ninety-five years'. It was emphasised in the report that it was not alternation.
Allocation concealment?	Unclear	No information.
Blinding? Mobility, functional outcomes, pain	No	No mention of blinding.
Blinding? Death, complications, readmission, re-operation	No	No mention of blinding, nor of measures taken to safeguard knowledge of allocation at follow-up data collection.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	No	Outcomes were not reported. Even so, there was incomplete long-term follow-up (only 175 of the 273 included patients - after post-randomisation exclusions) - see next item.
Incomplete outcome data addressed? Death, complications, readmission, re-operation	No	Trial recruitment and randomisation were at hospital admission (604 admitted), but only those 273 patients who were judged as being suitable, in that they could be expected to walk, at the two weeks clinical assessment were included in the analyses. The number of participants excluded at two weeks was not reported. However, those who were included were continued in the group allocated at randomisation.
Free of selective reporting?	No	No indication of a protocol. Interim results generally reported. Differences between papers in account of trial (e.g. stratification).
Free from baseline imbalance bias?	No	Baseline data not given for randomised groups nor except for gender and age groups for followed-up participants; al-

Graham 1968 (*Continued*)

		though all intracapsular fractures treated with same implant
Free from performance bias?	No	No information.

Hauer 2002

Methods	Randomised controlled trial using a protected random number system; stratified by hip- or lower-extremity fracture surgery and non hip- or lower-extremity fracture patients (see Notes)
Participants	Heidelberg, Germany Period of study: not stated, but trial may have started around 1997. 28 female participants Inclusion: female aged ≥75 years (25 with a fall-related hip fracture and 3 with elective hip surgery) who had experienced a recent injurious fall. Written informed consent and permission from orthopaedic surgeon. Exclusion: acute neurological impairment, severe cardiovascular disease, unstable or terminal illness, major depression, severe cognitive impairment, severe musculoskeletal impairment. Age: mean 81 years (range not stated) % male: none Number lost to follow-up: 4 (3 didn't start exercises and 1 dropped out)
Interventions	Continuation or community rehabilitation, started immediately upon hospital discharge. 1. 12 week regimen of intensive physical training (lower extremity progressive resistance training, progressive functional and balance training). All exercise sessions took place in training groups (4 to 6 patients) supervised by a therapeutic recreation specialist. Each session: 1.5 hours of resistive training (with recovery breaks) + 45 minutes of balance/functional training. Intensity of strength training adjusted to 70% to 90% of individual maximal workload. Basic functions such as walking, stepping or balancing were trained progressively with increasing complexity. versus 2. Placebo motor activity: 1 hour sessions of activities such as flexibility exercise, calisthenics, ball games, and memory tasks while seated. Both regimens, taking place 3 times a week, started on average 4-5 weeks after surgery upon discharge from inpatient rehabilitation. Both groups received identical additional physiotherapy (mainly massage, stretching, and application of heat or ice) twice weekly for 25 minutes: strength and balance training was excluded from these sessions.
Outcomes	Length of follow-up: 6 months (12 weeks + 3 months) Walking velocity and cadence Independent weight bearing Performance orientated motor assessment Box step Functional Reach Timed up-and-go Chair and stair rises

Hauer 2002 (*Continued*)

	Activities of daily living; sports and household activities Muscle strength: leg-press, leg-extensor, leg flexor, ankle-plantar flexion, hand grip strength (non-trained muscle group) Loss of independence Subjective fear of falling Subjective walking steadiness Emotional state: depression, morale and handicap scales Adherence
Notes	This trial was excluded in the versions of the review up to Issue 3, 2004 because the intervention began after the early post-operative period covered by this review, which then focused on early post-operative rehabilitation. Trial actually included 57 people who had experienced an injurious fall. One report of the trial gave the results for the subgroup of 28 participants who had had hip surgery. Of these, 25 had surgery for a fall-related hip fracture and three had elective hip surgery. The patient characteristics of the latter three women were confirmed as being essentially similar to those of the 25 women with hip fracture. A two-year follow-up of the trial is available but only for the whole trial population. Further information, including method of randomisation, received from lead trialist on 05/03/2004 and 24/06/04

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	"Randomization was performed .... using a protected random number system"
Allocation concealment?	Yes	"Randomization was performed by an external person who did not participate in the study using a protected random number system"
Blinding? Mobility, functional outcomes, pain	Unclear	"Main outcome variables were documented by a person blinded to the patients' group assignment." However, the blinding of participants was not guaranteed and care providers were not blinded.
Blinding? Death, complications, readmission, re-operation	Unclear	Not blinded but effect on bias unclear.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	No	Efforts had been made to collect outcome data for the four drop-outs; three of whom did not start the exercises and one who discontinued their exercises. However, these data were not available.

Hauer 2002 (*Continued*)

Incomplete outcome data addressed? Death, complications, readmission, re-operation	Unclear	While all participants were accounted for, there were incomplete data on complications (although: 'minor') and on long-term follow-up.
Free of selective reporting?	Unclear	Unclear. However, the 3 main reports of the trial were consistent in the reported outcomes and the author provided clarification on some of the outcome measures used.
Free from baseline imbalance bias?	Yes	Baseline characteristics were similar in the two groups.
Free from performance bias?	Yes	There was no cause for concern.

Karumo 1977

Methods	Randomised trial: use of random numbers
Participants	University Central Hospital, Helsinki, Finland Period of study: 01/05/1973 to 30/10/1974 100 participants Inclusion: people aged > 50 years with femoral neck fracture treated surgically (internal fixation or prosthesis), capable of independent 'getting about' before fracture. Exclusion: none given. Age: mean 73 years (range not stated; all over 50 years) % male: 25% Number lost to follow-up: 13 (excluded from 9 week follow-up because of inadequate follow-up), 4 (excluded from 3 month mortality data).
Interventions	Early post-operative rehabilitation, started first post-operative day onwards 1. Intensive (performed twice daily) physiotherapy regimen versus 2. Same regimen performed once daily (conventional care) Routine physiotherapy was on average 30 minutes per day. For the intensive group, the physiotherapy time was double this. Both were under supervision of the study physiotherapist. Regimen was continued for 14 days. From first post-op day, training in walking on crutches; training in sitting in chair; flexion-extension movements of knee, hip and ankle. Most patients allowed full weight bearing from the beginning. (For those with internal fixation, crutch use for up to 2 to 3 months.) From second post-op week, training in walking up and down stairs.
Outcomes	Length of follow-up: 3 months (for mortality) Walking ability Ability to move and sit up in bed on first post-operative day Abductor muscle strength Residence at 9 weeks Mortality

Karumo 1977 (*Continued*)

	"Mechanical" post-operative complications Medical complications including thromboembolism and post-operative infection Length of hospital stay
Notes	Of the 100 people recruited for the trial, 13 had inadequate follow-up and the results of these participants are not presented. Most of the results for the trial were presented split according to whether the participant had a prosthesis or internal fixation; rather than by the trial interventions. A thesis (1978, University of Helsinki) was located by Lesley Gillespie (10/06/2004). Requests for a copy met with no success.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	"Using random numbers the patients selected for the study were divided before the operation into two physiotherapy groups."
Allocation concealment?	Unclear	No report.
Blinding? Mobility, functional outcomes, pain	No	No mention of blinding.
Blinding? Death, complications, readmission, re-operation	Unclear	No mention of blinding.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	No	Results for 13 participants with inadequate follow-up were not presented.
Incomplete outcome data addressed? Death, complications, readmission, re-operation	No	Results for 13 participants with inadequate follow-up were not presented.
Free of selective reporting?	No	Mobility data split by treatment group were not presented.
Free from baseline imbalance bias?	No	There was a lack of information on baseline characteristics and comparability; data were not provided for 13 participants with inadequate follow-up. The report referred to a non-significantly greater number of patients in the routine physiotherapy group being treated with Jewett nails.
Free from performance bias?	Yes	Appears so: the same physiotherapist provided both interventions.

Lamb 2002

Methods	Randomised trial: use of sequential opened numbered sealed opaque envelopes; stratified by pre-injury mobility
Participants	John Radcliffe Nuffield Orthopaedic Hospital, Oxford, UK Period of study: not stated, earliest report located 1998. 27 female participants Inclusion: women aged ≥75 years who had surgical fixation (not total hip replacement) of a hip fracture, living in own home or a relative's home or in sheltered housing before their injury. Written informed consent. Exclusion: history of stroke or Parkinson's disease, clinical depression or acute mental illness, cognitive impairment: 6 or lower on the Hodkinson Mental Test Score. Other fracture, respiratory or cardiac failure sufficient to prevent their walking 50 feet (15.25 m), systolic blood pressure > 200 mmHg or diastolic blood pressure > 100 mmHg, surgical complications, pathological fracture. At medication assessment at day 6: on hypnotics, sedatives, muscle relaxant or medications likely to affect muscular function during postoperative period. Age: mean 84 years (range: not stated) % male: none Number lost to follow-up: 3 excluded. One had myasthenia gravis (confirmed independently as not related to trial), one a severe chest infection and the third patient withdrew consent after a few days.
Interventions	Early post-operative rehabilitation, started at 7 days after surgery. 1. Patterned neuromuscular (electrical) stimulation of the quadriceps muscle for three hours a day for 6 weeks. Stimulus intensity was the minimum required for visible muscle contraction. Each stimulus delivered 0.3 μC of charge. versus 2. Placebo stimulation for same time period. Interventions started in hospital one week post-surgery and continued at participants' homes after hospital discharge at 10-14 days. A trained assistant, who was independent of the study, showed the participants how to apply the stimulator.
Outcomes	Length of follow-up: 13 weeks Recovery of mobility Walking velocity Leg extensor power Compliance Pain (1: no pain to 6: severe pain) Side effects (none)
Notes	Patterned neuromuscular (electrical) stimulation is "a variable frequency stimulus (mean frequency 8.9 Hz) derived from the discharge of a fatiguing motor unit of the quadriceps". The stimulator was designed for home use, being portable and independent of an electric supply. Difficulties found by the participants in changing the batteries meant that weekly visits were required by study personnel.

Risk of bias

Item	Authors' judgement	Description

Lamb 2002 (*Continued*)

Adequate sequence generation?	Yes	"Randomization lists were prepared in advance of the study with a random number table."
Allocation concealment?	Yes	"Assignments were placed in sealed, numbered, opaque envelopes that were opened in a strict sequence after eligibility had been established and consent obtained."
Blinding? Mobility, functional outcomes, pain	Yes	"The investigator responsible for measuring outcomes and all participants were blind to the treatment assignment." Good attempt made to blind participants with placebo stimulation.
Blinding? Death, complications, readmission, re-operation	Unclear	Only complications reported.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	Unclear	No data, including group allocation, presented for the 3 people who did not complete the study
Incomplete outcome data addressed? Death, complications, readmission, re-operation	Unclear	Only complications reported.
Free of selective reporting?	Unclear	Probably, but no trial protocol, or trial registration available.
Free from baseline imbalance bias?	Unclear	Incomplete report of baseline data as those for the 3 post-randomisation exclusions were not available. No major differences in the available data for those followed up.
Free from performance bias?	Yes	

Lauridsen 2002

Methods	Randomised trial: use of consecutively drawn numbered sealed opaque envelopes
Participants	Rehabilitation Unit, Hvidovre Hospital, Copenhagen, Denmark Period of study: not stated 88 participants Inclusion: women aged 60 to 89 years transferred to a rehabilitation unit within 3 weeks after surgical treatment (osteosynthesis or partial hip replacement) of an "uncomplicated" hip fracture, full mobility prior to fracture, full weight-bearing allowed, no concomitant disabling disorders, informed consent

Lauridsen 2002 (*Continued*)

	Exclusion: patients who fell ill during the trial during the trial with symptoms that hindered training for more than 2 days, patients discharged before attaining the planned functional capacity. (These appear to be post-randomisation exclusion criteria.) Age: median 80 years (range 61-89 years) % male: none Number lost to follow-up: none (37 drop-outs still accounted for in analyses)
Interventions	Early post-operative rehabilitation 1. Intensive physiotherapy where patients were offered 6 hours per week, comprising 2 hours on Monday, Wednesday and Friday versus 2. Standard physiotherapy of 15-30 minutes per weekday Qualitative content of the two programmes were identical: bench exercises, gait, balance, co-ordination, stair climbing and, in some cases, hydrotherapy. Training was stopped when the planned functional capacity was attained unaided (walk 50 or more metres without resting in 2 minutes or less, using walking stick or quadraped if necessary; climb one flight of stairs; manage sit-to-stand transfer; move in and out of bed; manage bathing, dressing and lavatory visits) or when patients withdrew from study.
Outcomes	Length of follow-up: until discharge from hospital Use of walking aids Orthopaedic complication Length of hospital stay Duration of training & length of training period Drop-outs from training
Notes	Details of the method of randomisation provided on contact with lead trialist, but no other information gained. The current account of the trial is based on the report in the Danish Medical Bulletin. A colleague, Pernille Jensen, based in Denmark checked through the paper written in Danish (in Ugeskr Laeger) and confirmed that with the exception of a few small details, the English paper was a straight translation.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	"Patients were randomised"
Allocation concealment?	Yes	Letter from authors to Martyn Parker (06/08/2002): "numbered sealed opaque envelopes drawn consecutively"
Blinding? Mobility, functional outcomes, pain	No	"A blinded evaluation was performed by an external observer when the treating physiotherapist considered that the objective [attainment of functional capacity] had been obtained." However, this was after a non-

Lauridsen 2002 (*Continued*)

		blinded person had assessed achievement of functional goals.
Blinding? Death, complications, readmission, re-operation	Unclear	Insufficient information.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	Yes	Data provided for all participants for intention-to-treat analysis as well as per-protocol analysis.
Incomplete outcome data addressed? Death, complications, readmission, re-operation	Yes	As above.
Free of selective reporting?	Unclear	Possible but no confirmation.
Free from baseline imbalance bias?	Yes	Baseline comparability evident.
Free from performance bias?	Unclear	Incomplete assurance of comparability of other care provided to the two groups.

Mangione 2005

Methods	Randomised trial: use of a list of computer-generated random numbers
Participants	Community-dwellers in the vicinity of Arcadia University, USA Period of study: not stated 41 participants Inclusion: people aged 65 years or over living at home after successful hip fracture surgery (partial or total hip replacement or internal fixation) who were willing to go to Arcadia University for assessment, discharged from other physical therapy, informed consent Exclusion: medical contraindications (unstable angina; uncompensated heart failure; on renal dialysis) to resistance or aerobic exercise, stoke with hemiplegia, Parkinson's disease, life expectancy less than 6 months, Mini-Mental Status Exam score < 20, living in nursing home. Age (of 33 completers): mean 79 years (range 64 to 89 years) % male (of 33 completers): 27 Number lost to follow-up: 8 (1 unable to perform prescribed exercises, 2 withdrew consent, 1 diagnosis of progressive neuromuscular disorder, 4 hospitalisations of whom 2 died)
Interventions	Continuation or community rehabilitation, started 2 to 6 months The two intervention groups (1 and 2) received high-intensity home-based exercise supervised by a physical therapist in 20 visits over 12 weeks: twice-weekly for 8 weeks and once-weekly for 4 weeks. Each session lasted 30-40 minutes. 1. Resistance training group did 3 sets of 8 repetitions at 8 RM intensity using a portable resistance exercise machine for hip extensors, hip abductors, knee extensors and plantar

	flexors versus 2. An aerobic training group did activities that increased the heart rate to 65% to 75% of age-predicted maximum for 20 continuous minutes (walking, stairs climbing or ROM exercises) versus 3. Control group: Bi-weekly mailings on a variety of non-exercise topics. Participants asked not to begin any new exercise programmes until the study was completed. They were told that they were eligible to receive either of the exercise interventions at the end of the study.
Outcomes	Length of follow-up: 12 weeks; but only 8 weeks for the control group. 6-minute walk distance Maximum voluntary isometric force of the lower extremity Free gait speed SF-36 physical function Inability to do or pain during or from exercises Adherence Mortality and hospital readmission (reason for 4 drop-outs)
Notes	

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	"..assignment to a group was determined by referring to a list of computer-generated random numbers"
Allocation concealment?	Unclear	Unclear if allocation concealed.
Blinding? Mobility, functional outcomes, pain	Unclear	"The physical therapist examiner was masked to group assignment and performed all testing at baseline and after treatment. Different physical therapists provided the interventions and were masked to outcome testing results." However, there is no indication on whether the participants were told not to inform the assessor of their group allocation.
Blinding? Death, complications, readmission, re-operation	Yes	Outcomes are clearly reported and unlikely to be affected by lack of blinding.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	No	Participant flow diagram provided but differential loss to follow-up (6 from the resistance training group of 8 overall).

Mangione 2005 (*Continued*)

Incomplete outcome data addressed? Death, complications, readmission, re-operation	Yes	Participant flow diagram provided
Free of selective reporting?	Unclear	No protocol available. However, the two conference abstracts point to consistency in reporting.
Free from baseline imbalance bias?	No	Baseline data provided for only 33 of 41 participants. There were some between-group differences, which may have been clinically significant. In particular, the control group were more depressed and the time from surgery to the start of the study was around seven weeks more in the two exercise groups compared with the control group (19.4 versus 19.7 versus 12.6 weeks) .
Free from performance bias?	Unclear	Variation in delivery by the six physiotherapists may have occurred.

Miller 2006

Methods	Randomised controlled trial.
Participants	Orthopaedic wards of Flinders Medical Centre, Adelaide, Australia Period of study: recruitment September 2000 to October 2002 63 hip fracture patients (out of a total of 75 participants with fall related lower limb fracture) Inclusion: age 70 years or over, fall related lower limb fracture, resident in Southern Adelaide, malnourished (< 25th percentile for mid-arm circumference for older Australians) , written consent by patient or next of kin. Exclusion: unable to understand instructions for positioning of upper arm, could not full weight bear on side of injury > 7 days post admission, not independently mobile pre-fracture, medically unstable > 7 days post admission, cancer, chronic renal failure, unstable angina, diabetes. Age (of 75): mean 83.5 years % male (of 75): 23 Number lost to follow-up: 5 (3 dead at 12 weeks and 2 withdrew)
Interventions	Early post-op rehabilitation. Intervention started from 7 days after fracture. 1. Resistance training supervised by a physiotherapist three times per week, 20 to 30 minutes per session, for 12 weeks. To ensure standardisation, the trial physiotherapists were instructed to deliver only the structured programme of therapy to participants. Programme incorporated progressive resistance training of the hip extensors and abductors (supine), knee extensors (supine or sitting) and ankle dorsi and plantar-flexors (supine or sitting). Training was increased as soon as two sets of eight repetitions of the exercise

	could be completed in good form, judged by physiotherapist. versus 2. Resistance training + nutrition: Fortisip (Nutricia Australia Pty Ltd) oral protein and energy supplement (1.5 kcal/ml, 16% protein, 35% fat, 49% carbohydrate) to provide 45% of estimated energy intakes. (Individually prescribed and delivered.) Four doses of equal volume given by nurses from drug trolley, continued after hospital discharge at twice per day or more. Once weekly visits on weeks 7 to 12. versus 3. Attention control. Usual care and general nutrition and exercise advice. Tri-weekly visits on weeks 1 to 6, once weekly on weeks 7 to 12. Discussions during these visits were limited to general information (e.g. benefits of regular exercise and nutrient-dense meals). All participants were encouraged to continue prescribed treatments. All participants received usual clinical care (including general nutrition and exercise advice, usual dietetic and physiotherapy care, transfer to residential care, rehabilitation facility or directly home).
Outcomes	Length of follow-up: 12 weeks (mobility outcomes); 12 months (readmissions and admission to higher level of care). Gait speed Quadriceps strength Quality of life (SF-12 physical component score; and mental component score) Hospital readmission Admitted to higher level of care Mortality (separate data available for hip fracture patients) Length of hospital stay (acute, rehabilitation, total) Weight loss Adherence
Notes	Trial population also included 25 other participants (23 with hip fracture) who were allocated to the nutrition only intervention group. Data from this group are not included in this review. Of the 14 participants with other lower limb fractures: 6 were pelvic and 8 were of the femur, tibia or fibula. Further information on trial, including mortality data for hip fracture patients, provided to Alison Avenell by Maria Crotty for the nutrition supplementation review (Avenell 2010).

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	"Participants were randomized by using a stratified (admission accommodation: community or residential care) , block randomization method (blocks of 12) following baseline assessment." From summary data provided 25/07/2003: "computer generated table of random numbers"

Miller 2006 (*Continued*)

Allocation concealment?	Yes	"The Pharmacy department maintained a computer generated allocation sequence in sealed opaque envelopes."
Blinding? Mobility, functional outcomes, pain	Unclear	"Research staff blinded to treatment allocation performed outcome assessments (weight, quadriceps strength, gait speed, quality of life) 12 weeks after commencement of trial interventions." Care providers and patients not blinded.
Blinding? Death, complications, readmission, re-operation	Yes	Bias unlikely.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	No	Denominators for gait analysis, quadriceps strength etc not provided.
Incomplete outcome data addressed? Death, complications, readmission, re-operation	Unclear	Participant flow diagram provided (for 12 weeks); but inconsistent data provided at 1 year in a summary provided by trialists.
Free of selective reporting?	Unclear	Protocol not available.
Free from baseline imbalance bias?	Unclear	"No significant differences were identified across the four treatment groups." However, twice as many cognitively impaired patients (17) in attention control group compared with combined intervention group (8); 12 in exercise group.
Free from performance bias?	Unclear	No information. More attention control group participants (11) were referred for dietetic intervention as part of usual care; compared with exercise (6); and nutrition and exercise (5).

Mitchell 2001

Methods	Randomised controlled trial.
Participants	Geriatric Orthopaedic Unit (Lightburn Hospital) connected with Glasgow Royal Infirmary, UK Period of study: February 1997 to August 1998 80 participants Inclusion: people aged ≥65 years with hip fracture treated surgically, written informed consent. Exclusion: abbreviated mental score < 6/10, previously unable to walk, medically unstable. Age: mean 80 years (range not stated) % male: 16%

Mitchell 2001 (*Continued*)

	Number lost to follow-up: 16 (refused or unavailable); also 7 died and 13 with new comorbidity precluding assessment not included in final analyses.
Interventions	Early post-operative rehabilitation 1. Twice weekly quadriceps strengthening exercises in both legs for 6 weeks whilst a hospital inpatient on a rehabilitation ward. Sessions involved six sets of 12 repetitions of knee extension (both legs), progressing from 50% of participant's one-repetition maximum (weeks 1 & 2), 70% (weeks 3 & 4) and up to 80% (weeks 5 & 6). Participant's one-repetition maximum (maximum load an individual can lift through full range of knee extension) established initially and at 3 and 5 weeks. Plus usual care. versus 2. Usual care only. Consisted of conventional physiotherapy for approximately 20 minutes per day (5 days a week. Initial bed exercises, progressing to bed and chair transfers, gait re-education and balance training, to practice of functional activities in gym including use of parallel bars. Participants transferred to a rehabilitation unit at about 15 days (median 15 versus 16 days) after surgery for a hip fracture.
Outcomes	Length of follow-up: 16 weeks Elderly mobility scale Leg extension power Walking velocity Barthel index Nottingham Health Profile (gait speed, emotional reactions, energy, pain, physical mobility, sleep, social isolation) Hand grip strength 'Get up and go' test Functional reach Length of hospital stay Mortality
Notes	

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	"Randomisation was performed using computer-generated random numbers"
Allocation concealment?	Yes	"group allocation for each study patient concealed in a sealed envelope and held by a third party who was not otherwise involved in the study"
Blinding? Mobility, functional outcomes, pain	No	"Recordings were made by a single research assistant who was not blinded to study group allocation." While, "an independent blinded assessor performed repeat measurements of leg extensor in a convenience sample of 18"

Mitchell 2001 (*Continued*)

		participants at 6 weeks +2 days gave reassuring results, this was not considered an adequate protection against bias.
Blinding? Death, complications, readmission, re-operation	Yes	Bias unlikely.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	No	Bias could have occurred given the high loss of follow-up at 16 weeks (intervention: 50% versus control: 40%) .
Incomplete outcome data addressed? Death, complications, readmission, re-operation	Yes	Participant flow diagram provided.
Free of selective reporting?	Yes	Comprehensive report of outcome including consistent primary outcome.
Free from baseline imbalance bias?	Yes	In all key characteristics.
Free from performance bias?	Yes	Care other than the trial interventions appears comparable in the two groups.

Moseley 2009

Methods	Randomised trial: stratified randomisation based on a computer generated sequence, with details of allocation held in sealed opaque and sequentially numbered envelopes
Participants	Inpatient rehabilitation units of three teaching hospitals, Sydney, Australia Period of study: March 2002 to May 2005. 160 participants Inclusion: people with surgical fixation for hip fracture admitted to the inpatient rehabilitation unit from the acute orthopaedic ward. Approval to weight bear or partial weight bear; able to tolerate the exercise programmes; able to take four plus steps with a forearm support frame and the assistance of one person; no medical contraindications that would limit ability to exercise; living at home or low care residential facility prior to the hip fracture, with the plan to return to this accommodation at discharge. People with cognitive impairment were included if a carer who was able to supervise the exercise programme was available. Exclusion: high functioning patients discharged directly to home and low functioning patients discharged to a residential aged care facility from the acute orthopaedic ward. Patients with > 4 adjusted errors on the Short Portable Mental Status Questionnaire if no carer was available. Age: mean 84 years (range: not stated) % male: 19 Number lost to follow-up: 10 (3 withdrew consent; 7 died)

Interventions	Post-operative rehabilitation, started after admission to inpatient rehabilitation unit. Continued at home post-discharge. 1. Weight-bearing exercise twice daily for a total of 60 minutes per day for 16 weeks. Five weight-bearing exercises were prescribed in addition to walking on a treadmill with partial body weight support using a harness (for inpatients) or a walking programme (after hospital discharge). The five weight-bearing exercises used for both legs included stepping in different directions, standing up and sitting down, tapping the foot and stepping onto and off a block. Hand support could be used if necessary. The exercises were progressed by reducing support from the hands, increasing block height, decreasing chair height and increasing the number of repetitions. This commenced as an inpatient programme, followed by home visits and a structured home exercise programme after inpatient discharge. The home exercise programme incorporated the five weight-bearing exercises used in the inpatient phase, plus a walking programme. The frequency of home visits gradually decreased. versus 2. Usual care (mainly non-weight bearing exercise): participants undertook five exercises in sitting or lying plus a small amount of walking using parallel bars or walking aids for a total of 30 minutes each day for 4 weeks. The exercises were progressed by increasing the repetitions and resistance. (This type of exercise programme is commonly prescribed after hip fracture.) This commenced as an inpatient programme, followed by weekly home visits and a structured home exercise programme incorporating the same exercises. After 4 weeks, participants were provided with a tailored programme of limited weight-bearing exercises for 12 weeks and encouraged to continue exercising; no further physiotherapy home visits were undertaken. "All participants received usual post-operative mobilisation programme usually provided by other health professionals (e.g. occupational therapists) and any gait aids were progressed as per usual protocols. No other physiotherapy treatments were administered during the trial."
Outcomes	Follow-up: 16 weeks Walking ability: gait aid use, able to walk unaided Gait: walking velocity, Strength: knee extension Balance: step test, sway and functional reach, lateral stability, coordinated stability test, choice stepping reaction time Functional performance measures: Physical Performance and Mobility Examination, sit-to-stand time, Barthel Index Quality of life: EQ-5D Pain (7 point ordinal scale) Compliance and assessment of exercises Subjectively assessed (use of 5 point Likert scales): current mobility, strength and balance on five-point Falls: fell during study, modified Falls Efficacy Scale Accommodation in the community Use of community services Length of hospital stay Hospital readmission Mortality (stated as unrelated to trial protocol) Subjectively reported negative effects.

Notes		
Risk of bias		
Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	"Participants were randomly allocated.... Randomisation was stratified for recruitment site and pre-fracture Barthel Index (i.e. ≥80/100 or <80/100). The allocation sequence was generated from computer software..."
Allocation concealment?	Yes	"The allocation sequence was .... concealed using consecutively numbered, sealed and opaque envelopes."
Blinding? Mobility, functional outcomes, pain	Unclear	"All measurements were made by assessors who were blinded to group allocation." However, therapists who provided the rehabilitation programme were not.
Blinding? Death, complications, readmission, re-operation	Unclear	Unclear if knowledge of group allocation would have affected this.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	Unclear	Participant flow provided and full accounting of loss to follow-up but differential loss to follow-up (7 versus 3) could have made some difference.
Incomplete outcome data addressed? Death, complications, readmission, re-operation	Unclear	Participant flow provided but aside from death, these outcomes not reported for whole groups.
Free of selective reporting?	Yes	Trial registration and consistently well reported trial.
Free from baseline imbalance bias?	Yes	"There were no clinically important differences between the groups." Also evident from the presented data.
Free from performance bias?	Unclear	Possible, the trialists speculate that one reason for the general lack of differences between the two groups was that the therapists, who were not blinded to group allocation, may have modified the programme for participants in the control group.

Oldmeadow 2006

Methods	Randomised controlled trial.
Participants	Acute trauma ward, The Alfred Hospital, Melbourne, Australia Period of study: March 2004 to December 2004 60 participants Inclusion: people admitted for surgical fixation of a hip fracture (20 had hemiarthroplasty), written informed consent from patient or carer. Exclusion: pathological fracture, post-op orders for non-weight bearing on operated hip, admission from nursing home, non-ambulant pre-morbidity. Age: mean 79 years (range 53 to 95 years) % male: 32% Number lost to follow-up: none. Separate data provided for 10 failed early ambulators but also for whole early ambulation group.
Interventions	Early post-operative rehabilitation. Participants received routine, standard post-operative medical and nursing clinical care. All participants were transferred to sit out of bed as early as possible after surgery (range 13 to 120 hours). 1. Early assisted ambulation started within 48 hours (post-op day 1 or 2). versus 2. Delayed assisted ambulation until after 48 hours (post-op day 3 or 4). The same physiotherapy ambulation re-education programme, implemented for all participants, was implemented one daily over 7 days. Programme included walking re-education, bed exercise and chest physiotherapy as indicated. The two physiotherapists providing treatments received instruction regarding the ambulation protocol to ensure standardisation.
Outcomes	Length of follow-up: until discharge (1 week post-surgery for functional outcomes) Iowa Level of Assistance Scale (0 = independent; 1 = standby supervision; 2 = minimal assistance; 3 = moderate assistance; 4 = maximal assistance; 5 = failure) for transfers, ambulation and negotiation of one step Walking distance Discharge location Length of hospital stay Mortality (in hospital)
Notes	Mean time to surgery was 57 hours (6 to 264 hours). Trial authors noted that clinical practice was to prescribe bedrest in the presence of cardiovascular challenge.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	"Patients were randomly allocated, using a computer-generated program, into one of two time to first ambulation intervals.."
Allocation concealment?	Unclear	No mention of methods for safeguarding prior allocation concealment.

Oldmeadow 2006 (*Continued*)

Blinding? Mobility, functional outcomes, pain	No	"A blinded assessor carried out the testing." However, neither participants nor care providers were blinded.
Blinding? Death, complications, readmission, re-operation	Unclear	No blinding for discharge arrangements.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	Unclear	Standard deviations not provided and incomplete results for level of assistance scale. While separate data reported for the 10 failed early ambulators, results were reported for the whole early ambulation group.
Incomplete outcome data addressed? Death, complications, readmission, re-operation	No	Very short follow-up with no post-discharge data.
Free of selective reporting?	No	Trial registration was retrospective.
Free from baseline imbalance bias?	Yes	Baseline comparability evident.
Free from performance bias?	Yes	"The two physiotherapists who provided the treatments received instruction regarding the ambulation protocol to ensure standardisation."

Resnick 2007

Methods	Randomised trial using computer program that balanced with the nine hospitals. Allocation by independent project coordinator.
Participants	Community dwellers and independent ambulators (at time of fracture) who had completed Medicare funded rehabilitation recruited from 9 hospitals in the greater Baltimore area, USA Period of study: August 2000 to September 2005 (last follow-up) 155 participants (see Notes) Inclusion: female, aged 65 years or over with a non-pathological fracture which had occurred within 72 hours of hospital admission, who had had surgical repair of their hip fracture. Community dwellers and independent walkers before fracture. Free of medical problems that would potentially put them at risk of falls when exercising alone at home alone (e.g. neuromuscular conditions). Score of 20 or higher on the Folstein Mini Mental State Examination. Informed consent. Exclusion: angina, myocardial infarction, stroke, heart condition, pulmonary oedema, Paget's disease, uncontrolled diabetes, Parkinson's disease, multiple sclerosis, cancer, severe blindness, and TIA, DVT, seizures, GI haemorrhage (many criteria were limited to the previous 6 months). See trial registration document for full list (http://clinicaltrials.gov/ct2/show/NCT00389844). Age: mean 81 years % male: 0 (all female) Number lost to follow-up: 42 (25 withdrew, 10 impractical/other, 7 died)

Resnick 2007 (*Continued*)

Interventions	Continuation or community rehabilitation Planned to initiate the intervention as soon as Medicare-covered rehabilitation services were completed (generally around 1 month); but start dictated by participants. 1. Exercise only component. Exercise sessions with an exercise trainer. Sessions incorporated aerobic exercise using a 'Stairstep' (a 4 inch stair step with handles on either side for support and balance) for 3 days a week, a strengthening exercises for main muscle groups relevant to hip fracture recovery for 2 days a week (11 exercises with theraband and/or ankle wrist cuff weights up to 3 sets of 10 then weight increased), and stretching exercises (these were part of the warm up and cool down periods). Time and repetitions individually prescribed. (No encouragement given.) versus 2. The full 'Exercise Plus' programme, which includes the above together with the Plus component (motivational interventions: addition of education about the benefits of exercise form the same exercise trainer using a booklet, verbal encouragement through goal setting and positive reinforcement, medications/heat/ice (for pain), cueing with posters describing the exercises, a Goal Form and a calendar of daily exercise activities. versus 3. Routine care In both treatment groups (1 & 2), visits from the trainer were initially twice a week and then decreased to once a month in the final 4 months of the programme, with weekly telephone calls for those exposed to the 'plus' (motivation) component of the intervention during the weeks when no visit was scheduled. All visits lasted 1 hour. The maximum number of anticipated visits was 38.
Outcomes	Length of follow-up: 12 months from injury Activity levels: hours spent exercising per week; number of steps taken over a 48 hour period Mortality Adherence (number of intervention visits; participation) Self-efficacy expectations (not reported in this review) Outcome expectations (not reported in this review)
Notes	Extensive account of rationale published in 2002. Trial funded by the National Institute on Aging and National Institutes of Health. 209 were randomised into 4 groups. The 'Plus' or motivation only group (54 participants) is not considered in this review (*see* Crotty 2010). One participant in the exercise only group was excluded because they did not receive surgery.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	"Randomization was performed using a freeware computer program. Patient assignment was blocked by hospital to assure equal probabilities within each hospital being assigned to each of the four study groups. Patients were assigned to groups at

		random with forced balancing of treatment groups within hospital."
Allocation concealment?	Yes	"The resulting randomization scheme was given to the project coordinator and patients assigned as they became available at the indicated hospital. The study nurses involved with recruitment and data collection were blind to randomization."
Blinding? Mobility, functional outcomes, pain	Unclear	"The study nurses involved with recruitment and data collection were blind to randomization. Study participants were not informed of what specific arm of the intervention they were randomized to (i.e., exercise only, plus only, or exercise plus)." Safeguards were not described.
Blinding? Death, complications, readmission, re-operation	Yes	Unlikely to be influenced by blinding.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	Unclear	While participant flow diagram was provided, more participants (10) in the exercise only group refused study follow-up compared with 2 in usual care group.
Incomplete outcome data addressed? Death, complications, readmission, re-operation	Yes	Participant flow diagram provided.
Free of selective reporting?	Unclear	Retrospective trial registration. Insufficient information but no report of overall health status and muscle strength (as stipulated beforehand).
Free from baseline imbalance bias?	Yes	No obvious imbalance (all female)
Free from performance bias?	No	Time from fracture to first intervention visit from trainer ranged from 28 to 200 days. Participants indicated when they were willing to have their first visit.

Sherrington 1997

Methods	Randomised trial: use of random numbers, balanced within blocks of 10 participants, to generate open list.
Participants	South Western Sydney, Australia Period of study: December 1994 to December 1995 44 participants Inclusion: people aged 60 years or over with a fall-related hip fracture who had lived in the community beforehand. Discharged from 1 of 4 acute hospitals to home or residential care within 9 months of their fracture. Contactable and consenting. Exclusion: severe cognitive impairment or too ill or immobile to participate as judged by carers. Age (of 42): mean 78.5 years (range 64-94 years) % male: 21 Number lost to follow-up: 2 (withdrew consent); also 2 excluded at initial assessment. Also mentions: "One further person in the control group was not able to complete al the physical aspects of the assessment because of pain from a fall, later diagnosed as a further fracture."
Interventions	Continuation or community rehabilitation All participants had a preliminary interview and physical assessment lasting about 1 hour. This took place on average 7 months (5-9 months) after their injury. 1. Home-based weight-bearing exercises for 1 month. Individuals in the intervention group were provided with stepping block(s) made of old telephone directories wrapped up with tape and shown the exercises by a physiotherapist. They were advised on how many stepping blocks and repetitions to do at least once daily at the start (these ranged from 5 to 50) and told to increase the repetitions gradually. A photograph was taken to help remind the participant of the correct method and they were checked at 1 week (4-16 days). Participants also kept a diary. versus 2. Control (no specific instructions: usual care) Each telephone directory was 5 cm thick: approximately one third of a standard house step.
Outcomes	Length of follow-up: 1 month (range 27-43 days) Quadriceps strength Sway and balance Functional reach Walking velocity and cadence Independent weight bearing Compliance and participation in other general exercise Subjectively assessed risk of falling Subjectively assessed balance
Notes	This trial was excluded in the versions of the review up to Issue 3, 2004 because participants were recruited 7 months after a hip fracture; this was previously outside the time period covered by this review, which then focused on early post-operative rehabilitation. Additional information obtained from Cathie Sherrington 09/02/2004 and 24/03/2004
Risk of bias	

Sherrington 1997 (*Continued*)

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	"randomly allocated in order of contact using a random number method within groups of ten subjects."
Allocation concealment?	No	Trial investigator reported that "it was not concealed - just a list of subject numbers and group allocation generated by a random number table; subjects were assigned to subject numbers in the order that contact was made with them."
Blinding? Mobility, functional outcomes, pain	No	Not blinded.
Blinding? Death, complications, readmission, re-operation	Unclear	The few results are unlikely to be affected.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	Unclear	The post-randomisation exclusion of two participants meant that intention-to-treat analysis was not done.
Incomplete outcome data addressed? Death, complications, readmission, re-operation	Yes	Few data but complete data provided on contact with trial investigator.
Free of selective reporting?	Unclear	Bias unlikely but protocol not available.
Free from baseline imbalance bias?	No	Statistically significantly more males in intervention group (8 versus 1). Males generally have poorer prognosis post hip fracture but also may have different baseline strength and attitude to exercises.
Free from performance bias?	Unclear	There was a lack of information on care-programme comparability.

Sherrington 2003

Methods	Randomised trial: use of random numbers, balanced within blocks of 6 participants.
Participants	Inpatient rehabilitation wards at Bankstown-Lidcombe Hospital, Sydney, Australia Period of study: January 1997 to December 1999 80 participants Inclusion: people aged 60 years or over with a fall-related hip fracture who were admitted to rehabilitation wards after surgery, written consent.

	Exclusion: unable to complete assessment and participate in exercise programme due to a) cognitive impairment (assessed by observation), b) major medical conditions, or c) complications from fracture (if directed to be non weight-bearing or touch weight-bearing due to problems with fracture fixation). Age: mean 81 years (range 64-98 years) % male: 32 Number lost to follow-up: 3 (1 withdrew consent; 2 with actual or suspected problems with fracture fixation precluding their further participation)
Interventions	Early post-operative rehabilitation. Baseline assessment at mean 18.3 days from fracture. The program commenced while the participant was on the rehabilitation ward and was carried out each weekday in the rehabilitation gymnasium. Participants (21) were advised to continue the programme at home if discharged before the final assessment. 1. Two-week programmes of weight-bearing (weight-bearing position with support as required) exercise prescribed by a physiotherapist. Exercises were sit-to-stand, lateral step-up, forward step-up-and-over, forward foot taps, and a stepping grid. Exercises initially conducted with support of a walking frame or adjustable-height tables. Exercises progressed by increasing the number of repetitions, lessening the hand support, increasing the height of blocks, decreasing height of surface from which the participants was standing up etc. versus 2. Non-weight-bearing (performed in the supine position) exercise prescribed by a physiotherapist. Exercises were hip abduction, hip flexion, hip/knee flexion/extension, end of range knee extension, ankle dorsiflexion/plantarflexion. Exercises were progressed by increasing the number of repetitions undertaken. For both groups, the treating physiotherapist chose several initial exercises, then added extra exercises in keeping with the participant's capability. Number of repetitions was established on the basis of the participant's initial performance (ranged from 5 to 30 for a single exercise). Participants were encouraged to take prescribed pain relief before exercising. All participants also received usual physiotherapy intervention involving practice of walking and assessment of task s needed for discharge (bed mobility, sit-to-stand and stair climbing), and usual care from other health professionals (nursing staff, social workers etc).
Outcomes	Length of follow-up: 2 weeks Walking ability: use of supports Gait: walking velocity, step length, force plate weight-bearing Strength: hip abduction and flexion and knee extension Balance: step test, sway and functional reach Functional performance measures Compliance and assessment of exercises Subjectively assessed (use of ordinal scales): risk of falling, balance, pain, sleep quality, health Fracture fixation problems Length of hospital stay
Notes	Trial, previously listed in Ongoing studies under Sherrington 2002, was performed as part of Cathie Sherrington's PhD work.

	Additional information provided 15/01/2004 by Cathie Sherrington included further details of method of randomisation and data for self-assessed outcomes.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	"Patients were randomised into one of two exercise groups using a random number table and randomisation in blocks of six."
Allocation concealment?	Yes	"Subjects were assigned into groups using a concealed randomisation method". Clarification of method by personal communication: "This method involved a list of group allocation by subject number on which group allocation for each subject was concealed by a separate piece of opaque paper. Once the subject had agreed to participate in the trial, one piece of paper was removed to reveal the group allocation for the subject in question without revealing the allocation for subsequent subjects."
Blinding? Mobility, functional outcomes, pain	No	Assessor was not blinded to group allocation.
Blinding? Death, complications, readmission, re-operation	Unclear	Unlikely to be affected by the lack of blinding.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	Unclear	Intention-to-treat analysis was done and a participant flow diagram provided. However, the denominators for various outcomes were quite varied.
Incomplete outcome data addressed? Death, complications, readmission, re-operation	Unclear	Very short follow-up.
Free of selective reporting?	Unclear	Bias unlikely but protocol not available.
Free from baseline imbalance bias?	Yes	Baseline comparability evident.
Free from performance bias?	Yes	Care other than interventions under test comparable in both groups.

Sherrington 2004

Methods	Randomised trial: use of random numbers, balanced within blocks of 6 participants. Use of sealed opaque numbered envelopes.
Participants	Community dwellers and residents of aged-care facilities discharged from 6 hospitals in Sydney, Australia Period of study: April 1998 to June 2000 120 participants Inclusion: people who had completed usual care after a fall-related hip fracture, consent. Exclusion: unable to complete assessment and participate in exercise programme due to a) severe cognitive impairment, b) medical conditions, or c) complications from fracture resulting in delayed healing and associated weight-bearing restrictions. Age: mean 79 years (range 57-95 years) % male: 20 Number lost to follow-up: 12 (7 withdrew consent - refused assessment; 5 died)
Interventions	Continuation or community rehabilitation. All participants had a preliminary assessment which took place on average 22 weeks after their injury. 1. Home-based weight-bearing exercises (weight-bearing position with support as required). Exercises were sit-to-stand, lateral step-up, forward step-up-and-over, forward foot taps, and a stepping grid. Exercises initially conducted with tables, chairs or walking aids used for support. Exercises progressed by increasing the number of repetitions, lessening the hand support, increasing the height of blocks, decreasing height of surface from which the participants was standing up etc. versus 2. Home-based non-weight-bearing exercises (performed in the supine position) prescribed by a physiotherapist. Exercises were hip abduction, hip flexion, hip/knee flexion/extension, end of range knee extension, ankle dorsiflexion/plantarflexion. Exercises were progressed by increasing the number of repetitions undertaken. versus 3. Control (no specific instructions) For both exercise groups, the prescribing physiotherapist chose several initial exercises and number of repetitions in keeping with the participant's capability. Individuals in the weight-bearing group were provided with stepping block(s). Participants were advised on progression. Line drawings of the exercises were provided and they were checked at 1 week. Further assessment and prescription at 1 and 4 months. Participants also asked to keep a record of their exercises. Exercises were prescribed for 4 months minimum. Advice for exercises etc given to each participant as deemed appropriate by the physiotherapist conducting final assessment at 4 months.
Outcomes	Length of follow-up: 4 months Walking ability/mobility Gait: walking velocity, step length Strength: hip abduction and flexion and knee extension Balance: step test, sway and functional reach Functional performance measures: timed sit-to-stand, supine-to-sit and Physical Performance and Mobility Examination Mortality Subjectively assessed: risk of falling, balance, pain, sleep quality, health

	Compliance and assessment of exercises (intervention groups only) Falls	
Notes	Trial was performed as part of Cathie Sherrington's PhD work. Additional information, including binary data for mobility and subjective outcomes, received 09/02/2004.	
Risk of bias		
Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	"The randomization schedule was produced with a random number table, with subjects being randomized to groups in blocks of 6."
Allocation concealment?	Yes	"..subjects were allocated to groups using assignments sealed in opaque envelopes." Clarification of method by personal communication: "Group allocation enclosed in sealed opaque envelopes which were numbered by subject number which was allocated when the consent form was signed."
Blinding? Mobility, functional outcomes, pain	No	Assessors were not blinded. However, there was training with the aim to standardisation between the three testers.
Blinding? Death, complications, readmission, re-operation	Unclear	Unlikely to be affected by the lack of blinding.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	Yes	Intention-to-treat analysis was done and a participant flow diagram provided. Though percentages were presented in the trial report, full data was provided by contact with the lead trialist.
Incomplete outcome data addressed? Death, complications, readmission, re-operation	Yes	Intention-to-treat analysis was done and a participant flow diagram provided.
Free of selective reporting?	Unclear	Bias unlikely but protocol not available.
Free from baseline imbalance bias?	Yes	Visual inspection of the table of baseline characteristics was consistent with the claim in the report of there being no clinically important or statistically significant differences between the three study groups at the initial assessment.

Free from performance bias?	Yes	A systematic approach was taken.

Tsauo 2005

Methods	Randomised: method not specified
Participants	People recently discharged from an acute orthopaedic unit, National Taiwan University Hospital, Taiwan Period of study: 0/10/2000 to 30/09/2001 54 participants Inclusion: people recently discharged from hospital after surgery for a hip fracture, agreement for participation from patient and surgeon, written informed consent. Exclusion: patient or family rejected further treatment or follow-up, did not have transport or were not in hospital neighbourhood, were unable to cooperate due to cognitive problems, or had ongoing medical litigation. Age (of 25 completers): mean 73 years (range not given) % male (of 25 completers): 20 Number lost to follow-up: 29 (25 lost and 4 excluded due to low compliance)
Interventions	Continuation or community rehabilitation, post hospital discharge (mean 11 days) 1. Home-based individualised physical therapy programme delivered in 8 visits over 3 months and involving strengthening exercises, ROM exercises, balance training, functional training (such as sit-to-stand, ambulation and stair-climbing training), practice of transfer techniques, adjustment of walking aids and adaptation and modification of the home environment. Five exercises were taught at each visit, initially in 3 sets of 10 repetitions a day for each item, progressed at the visits. versus 2. Practice of an exercise programme given at the bedside before discharge. All participants had had bedside physiotherapy during their hospital stay
Outcomes	Length of follow-up: 6 months Range of hip flexion Strength: hip flexors, hip extensors, hip abductors, knee extensors Walking speed Harris hip score; pain and total-pain. Quality of Life assessed the domains of the WHOQOL-BREF (physical health, psychosocial, social relationship, environment) Medical complications
Notes	Article notes that most people in Taiwan do not receive physiotherapy after they leave hospital because there is no insurance payout for such services.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Unclear	"Patients were randomized". The method of randomisation was not described.

Tsauo 2005 (*Continued*)

Allocation concealment?	Unclear	"Patients were randomized". No methods for concealing allocation were described.
Blinding? Mobility, functional outcomes, pain	No	No blinding was reported.
Blinding? Death, complications, readmission, re-operation	Unclear	No blinding was reported - unknown risk of bias.
Incomplete outcome data addressed? Mobility, functional outcomes, pain	No	Baseline and six-month follow-up data were only available for 25 of the 54 trial participants and an intention-to-treat analysis was not carried out. Four poor compliers with the intervention were excluded.
Incomplete outcome data addressed? Death, complications, readmission, re-operation	No	As above.
Free of selective reporting?	Unclear	The outcomes recorded appeared to be reported.
Free from baseline imbalance bias?	Unclear	Baseline data were only available for 25 of the 54 trial participants. For these 25 participants, only diabetes differed significantly between the two groups. The authors reported that the number and characteristics of the 25 participants (four others were excluded for low compliance) lost to follow-up were similar between the two groups.
Free from performance bias?	Yes	There appeared to be care programme comparability before discharge and identical follow-up assessment procedures.

ADL: activities of daily living
PPT: Physical Performance Test
ROM: Range of Motion
RM: Repetition Maximum, i.e. 8 RM is the weight that can only be lifted 8 times

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

Study	Reason for exclusion
Allegrante 2001	This trial involving 152 participants with primary unilateral hip fracture, age 65+ years, compared a multifactorial intervention (patient instruction protocol; hospital-based 8-week programme of high-intensity isokinetic strength training; and at-home walking programme and supportive phone calls including contact with peer advocate) with standard medical care. It was excluded because the effects of the mobilisation part of the multifactorial intervention could not be determined.
Barber 2002	This was a small case-control, and thereby excluded, study of electrical stimulation during rehabilitation following proximal femoral fracture. The historic control group was derived from participants of Mitchell 2001.
Carmeli 2006	Described as a comparative study of organised versus home-based exercise programmes after hip surgery involving open reduction and internal fixation. Although 63 patients were "randomly divided" into the two groups, nine were not randomly divided in order to adjust for "several technical limitations and personal adaptations". The randomisation process was thus too compromised for inclusion in the review.
Crotty 2002	Early discharge trial comparing home rehabilitation with conventional care in hospital. Not in scope of review.
Di Lorenzo 2007	Trial investigated the effectiveness of specific training for treating low back pain in people who had had surgery for hip fracture. Not in scope of review.
Franczuk 2005a	This study investigated the use of continuous passive motion. Upon translation from Polish, it was found not to be a randomised controlled trial.
Franczuk 2005b	This study investigated the use of continuous passive motion. Upon translation from Polish, it was found not to be a randomised controlled trial.
Giangregorio 2005	This study of treadmill training was originally registered as an RCT with a recruitment start date of December 2005. However, the study design changed to a completed non-randomised study in 2009.
Hesse 2003	Treadmill training plus physical therapy versus physical therapy was compared in 80 patients receiving a first time unilateral hip replacement, five of whom had had a hip fracture. The number of hip fracture patients was too few for inclusion in the review.
Johnston 1995	Trial, only identified in a trial register, comparing early home rehabilitation program versus traditional rehabilitation programme in patients with hip fractures. Not in scope of review.
Kishida 2001	Immediate weight bearing versus weight bearing at six weeks was compared in 33 patients with 37 hips who received an uncemented total hip arthroplasty; there is no indication in the trial report that these were hip fracture patients.
Kuisma 2002	This trial compared discharge from an acute ward to home with visits by a physiotherapist versus usual care in a rehabilitation centre in 81 hip fracture patients. The trial is primarily a home versus hospital comparison and thus was excluded.
Lehmann 1961	This quasi-randomised and dated trial compared ultrasound with infrared for the treatment of joint contracture after internal fixation of hip fracture in 30 people. This trial was excluded as most of the implants used and, in particular, the 10 day delay to physiotherapy, which may have exacerbated the complication the trial set out to

(*Continued*)

	treat, are not consistent with current practice.
Licciardone 2004	Osteopathic manipulative treatment was compared with sham treatment in 60 people who had recently had surgery for knee (30 participants) or hip (14 participants) osteoarthritis or hip fracture (16 participants). Separate data for hip fracture patients were not provided. The trial reported, without data, no significant differences in primary outcomes (changes in functional independence measure scores, daily analgesic use, rehabilitation unit stay, or changes in the SF-36 health outcomes scores) between the hip fracture patients in the two groups. This trial was excluded because of the clear imbalance in the numbers of hip fracture patients in the two groups (5 versus 11), together with known differences in the surgery (internal fixation: 2 versus 1) and potential for other important differences in other patient characteristics.
Maltby 2000	There were 22 fairly frail patients in this randomised controlled trial comparing visual biofeedback training and physiotherapy versus physiotherapy alone in the treatment of proximal femoral fracture patients. The patients were followed up for 2 weeks. Though a draft report of the trial was received (July 2000), it was insufficiently complete to include in the review. Simon Maltby left the hospital soon afterwards. Contact with Prof WM Harper in March 2004 revealed that no further progress had been made with the study or its write up and that it is now shelved.
Mendelsohn 2008	Randomised trial testing upper-body exercise programme using an upper-arm crank ergometer. The main focus of this trial was cardiovascular fitness and, while various functional and mobility outcome measures were reported, the intervention is not a mobilisation strategy in itself.
Ohsawa 2007	Non-randomised comparison of rehabilitation in conservatively treated hip fracture patients.
Olivetti 2007	Randomised trial evaluating a weight-bearing strengthening programme for hospital inpatients of which only one had hip fracture.
Portegijs 2008	Trial investigated progressive strength resistance training in people who had had hip fracture at a mean of 4.4 years previously. This was considered to be outside the scope of the review in terms of timing. A 12 month limit for starting the intervention was specified to clarify this in the review.
Shyu 2005	In this randomised controlled trial, an interdisciplinary programme of geriatric consultation, continuous rehabilitation and discharge planning was compared with routine care in 137 elderly people with hip fracture. Not in scope of review.
Stenvall 2007	Randomised trial of a multidisciplinary intervention programme for people after hip fracture. While mobility outcomes are reported, the effects of the various components of the complex intervention can not be separated out.
Tinetti 1999	This trial compared systematic multi-component home based rehabilitation involving physical therapy and functional therapy (for activities of daily living) versus usual care in 304 non-demented patients aged 65+ years post hospital/subacute facility discharge for surgically repaired hip fracture. It was excluded because the effects of the mobilisation part of the multi-component intervention could not be determined.

Characteristics of studies awaiting assessment *[ordered by study ID]*

Mangione

Methods	Randomised trial, assessor blinded
Participants	26 patients aged 65 years or above who had surgery for their hip fracture within the previous six months
Interventions	Community rehabilitation (in the home) 1. Progressive resistance exercise for 10 weeks 2. TENS (transcutaneous electrical nerve stimulation) for 10 weeks
Outcomes	Follow-up: 12 months Function, self-reported exercise, self-efficacy, exercise behaviour and activity
Notes	Started: August 2002; Completed: June 2006; Trial registered: October 2009. No publication found.

Orwig

Methods	Randomised trial, assessor blinded Three centres
Participants	180 women aged 65 years or above who had surgical repair of their hip fracture
Interventions	Community rehabilitation 1. 'Exercise plus' intervention (*see* Resnick 2007) 2. Control
Outcomes	Follow-up: 12 months Function, self-reported exercise, self-efficacy, exercise behaviour and activity
Notes	Publication pending (September 2010)

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

INTERACTIVE

Trial name or title	Individual nutrition therapy and exercise regime: a controlled trial of injured, vulnerable elderly (INTERACTIVE trial)
Methods	"Participants will be randomly assigned following completion of all baseline measures. Group allocation will be managed externally by the Pharmacy Department"
Participants	Community dwelling older adults (> 70 years) with a surgically treated proximal femoral fracture. Aim for 460 participants.

INTERACTIVE (*Continued*)

Interventions	1. Six month individualised exercise and nutrition programme starting within 14 days of hip fracture surgery: weekly home visits and telephone consults 2. Attention control: weekly social visits for 6 months
Outcomes	Follow-up: 12 months Physical function, strength and balance Body composition and nutrition measures Quality of life caregiver burden and strain index Change in accommodation, falls, injuries and change in health status Economic evaluation
Starting date	June 2007 for recruitment; completion of follow-up until September 2009
Contact information	Susie K Thomas Rehabilitation and Ageing Studies Unit Flinders University Adelaide South Australia Australia email: thom0767@flinders.edu.au
Notes	

Jette

Trial name or title	Efficacy of a post-rehabilitation exercise intervention
Methods	Multi-site randomised controlled trial. Blinded outcomes assessor
Participants	People aged 60 years or more with recent hip fracture who have one or more residual functional limitations after completion of all inpatient, outpatient or home care rehabilitation services. Aiming for 230 participants.
Interventions	1. Strong for life programme. "This home-based exercise program will include both resistance exercises using Thera-bands that will be shown on a video/DVD and weight-bearing exercises that are progressed using a step and/or a weighted vest. A cognitive-behavioral program that is customized for people recovering from hip fracture is being developed that will focus on promoting exercise adherence, decreasing fear of falling and increasing the return to daily activities in the patient's home and community." 2. Control
Outcomes	Follow-up: 9 months Function measured by both self-report (AM PAC) and physical performance measures Disability, self-efficacy, balance, strength, cognition, and health-related quality of life Adherence to the exercise program and adverse events will also be monitored
Starting date	Start date: April 2008 Estimated completion date: July 2011

Jette (*Continued*)

Contact information	Jonathan Bean, MD Health and Disability Research Institute Boston University USA email: jfbean@partners.org
Notes	

Kristensen

Trial name or title	Strength training after hip fracture surgery
Methods	Randomised trial, blinded assessor
Participants	Patients, aged 60 years or above, with primary hip fracture who were independent ambulators prior to fracture. Aiming for 60 participants.
Interventions	During admittance in an acute orthopaedic ward 1. Intensive strength training of fractured leg 2. Usual care
Outcomes	Follow-up: 3 months post surgery Knee extension strength in fractured leg relative to non-fractured leg Timed up and go test, 10 metre speed time, sit to stand test, "New Mobility Score"
Starting date	Start: January 2011 Estimated completion date: July 2011
Contact information	Morten T Kristensen Department of Orthopedic Surgery Hvidovre Hospital Hvidovre, Copenhagen, Denmark, 2650 email: morten.tange.kristensen@hvh.regionh.dk
Notes	

Martinsen

Trial name or title	Observation and progressive strength training after hip fracture
Methods	Randomised trial in 2:1 ratio at 12 weeks after fracture. Blinded outcomes assessor
Participants	Hip fracture patients. Enrolled 150 participants.
Interventions	Started at 12 weeks post fracture. Patients randomised in a 2:1 manner to: 1. Intervention - progressive strength training - for 12 weeks. After 12 weeks, randomisation to further intervention or not. 2. Control.

Martinsen (*Continued*)

Outcomes	Follow-up: 24 weeks Primary outcome: Bergs balance scale Secondary: strength via Sit to Stand test
Starting date	Start date: June 2007 Estimated completion date: December 2010
Contact information	Mette Martinsen Oslo University Hospital Oslo Norway
Notes	

MASTER

Trial name or title	MASTER program: Preventing falls and disability in older adults after hip fracture
Methods	Randomised trial
Participants	Older community dwelling women who have sustained their first hip fracture. Aged between 65 and 80 years. Aiming for 174 participants.
Interventions	1. One year of a graduated exercise program (the MASTER program) + standard care 2. Standard care only
Outcomes	Follow-up: 12 months Primary outcome: Fall rate, measured by self-reported daily fall diaries Secondary outcomes: Physical Activities Scale for the Elderly questionnaire, functional outcome, bone health, physical activity, muscle strength and balance
Starting date	February 2009
Contact information	Erin Gorman Centre for Hip Health & Mobility Vancouver Coastal Health Research Institute Vancouver, British Columbia, Canada, V5Z 1M9 email: Maureen.Ashe@exchange.uba.ca
Notes	

Overgaard

Trial name or title	Training of patients with hip fracture
Methods	Randomised trial. Blinded outcomes assessor
Participants	Hip fracture patients who are full weightbearing on the affected leg. Aged 60 years or over. Living on own home with an independent walking ability. Within 2 weeks after discharge from hospital. Aiming for 120 participants.
Interventions	1. 12 weeks of physical training consisting of muscle strength training of both legs, balance and coordination exercises 2 times a week. 2. 6 weeks of physical training (as above)
Outcomes	Follow-up: 24 weeks after baseline testing Changes in knee-extension strength Changes in the Timed Up & Go test-time
Starting date	Start date: March 2010 Estimated completion date: June 2013
Contact information	Jan Overgaard Maribo Health Center Maribo, Denmark, 4930 email: jover@lolland.dk
Notes	

ProMo

Trial name or title	Physical activity and rehabilitation program among community-dwelling hip fracture patients: a single centre randomised controlled trial
Methods	Single centre randomised controlled trial
Participants	Community-dwelling men and women aged over 60 years who were operated for hip fracture at the local hospital. Aiming for 80 participants.
Interventions	1. Individually tailored physical rehabilitation programme aiming to restore mobility (ProMo). The one year intervention starts within one month (at least six weeks after discharged from the health care centre). "ProMo is a multicomponent rehabilitation protocol consisting of individual progressive home exercise program and counselling/management sessions for physical activity promotion and pain and fear of falling management. Usage and satisfaction with assistive devices for walking will also be discussed." 2. Usual care. The control group is instructed to follow the guidelines provided by the hospital and health care centre.
Outcomes	Follow-up: 12 months (after end of intervention) Primary outcome: Short Physical Performance Battery (SPPB) including habitual walking speed, chair rise and balance tests (3 and 6 months). Mobility limitation and disability (1 year)

ProMo (*Continued*)

Starting date	Start date: 01/01/2008 Estimated completed date: 30/06/2012
Contact information	Dr Sarianna Sipilä Rautpohjank 8a Jyvaskyla 40700 Finland email: sarianna.sipila@jyu.fi
Notes	

DATA AND ANALYSES

Comparison 1. Early (< 48 hours) versus delayed (> 48 hours) assisted ambulation after surgery

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Time to first walk			Other data	No numeric data
2 Poor functional mobility at 7 days	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
2.1 Assistance required for transfers	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.2 Failed or unable to negotiate one step unassisted	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3 Mean walking distance at 7 days (metres)			Other data	No numeric data
4 Mortality and cardiovascular challenged participants	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
4.1 Dead before discharge	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4.2 Positive troponin test	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5 Discharge location	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
5.1 Discharge to nursing home	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.2 Dead or discharge to rehabilitation facility or nursing home	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6 Length of hospital stay			Other data	No numeric data

Comparison 2. Early (2 weeks) versus delayed (12 weeks) weight bearing

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Mortality	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
1.1 1 year	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.2 3 years	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2 Non-union (fixation failure)	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
2.1 1 year	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.2 3 years	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3 Avascular necrosis	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
3.1 1 year	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3.2 3 years	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4 Unfavourable outcome (death, failure or infection)	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
4.1 1 year	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4.2 3 years	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

Comparison 3. Intensive versus usual physiotherapy

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Orthopaedic complication (as reason for withdrawal from trial)	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
2 Adductor muscle strength (kp) at 9 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
2.1 Fractured leg	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
2.2 Non-fractured leg	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3 Non-completion of training programme	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
4 Withdrawal from trial by patient	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
5 Training intensity and duration			Other data	No numeric data
6 Length of hospital stay (days)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
7 Length of hospital stay			Other data	No numeric data

Comparison 4. Weight-bearing exercises versus non-weight-bearing exercises

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Unable to walk at all or without two sticks or a frame	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
1.1 Unable to walk at all	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.2 Unable to walk unaided or with one stick alone	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2 Unable to do a lateral step-up unsupported or with one hand alone	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
2.1 Fractured leg	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.2 Non-fractured leg	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3 Physical Performance and Mobility Examination score (0: failure to 12: top score)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4 Gait parameters	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4.1 Velocity (m/sec)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
4.2 Steps per second	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
5 Balance	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
5.1 Functional reach distance (cm)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.2 Step test fractured leg (reps)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.3 Step test non-fractured leg (reps)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable

6 Subjective rating of pain, fall risk, balance, sleep quality and general health	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
6.1 Serious activity-inhibiting pain	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.2 Considered themselves as at moderate or high risk of falling	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.3 Unsteady balance	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.4 Sleep quality: 'OK' at most	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.5 Only good or worse general health	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7 Fracture fixation problems	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
8 Strength measures (newtons)	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
8.1 Hip abduction fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.2 Hip abduction non-fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.3 Hip flexion fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.4 Hip flexion non-fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.5 Knee extension fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.6 Knee extension non-fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9 Participant's perception of exercise programmes	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
9.1 Had difficulty with exercises	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.2 Experienced moderate or marked pain during exercise	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.3 Exercises not considered even of moderate usefulness	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10 Total length of stay in hospital (days)	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected

Comparison 5. Quadriceps training programme versus conventional physiotherapy alone

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Functional mobility (Elderly Mobility Scale)			Other data	No numeric data
2 Gait speed (metres / second)			Other data	No numeric data
3 Timed up and go (seconds)			Other data	No numeric data
4 Functional reach (inches)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4.1 At 6 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
4.2 At 16 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable

5 Mortality	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
6 New comorbidity at follow-up	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
7 Barthel Index (disability): 20 point scale		Other data	No numeric data
8 Nottingham Health Profile (health status)		Other data	No numeric data
9 Leg extensor power (watts)	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
9.1 Fractured leg at 6 weeks	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.2 Non-fractured leg at 6 weeks	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.3 Fractured leg at 16 weeks	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.4 Non-fractured leg at 16 weeks	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable

Comparison 6. Treadmill gait training versus conventional gait training

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Failure to regain pre-fracture mobility	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
2 Gait velocity (metres/minute)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected

Comparison 7. Electrical stimulation of quadriceps versus no or placebo stimulation

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Functional mobility (Elderly Mobility Scale)			Other data	No numeric data
2 Failure to regain pre-fracture mobility	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
2.1 At 7 weeks	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.2 At 13 weeks	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3 Gait velocity (walking speed over 15.25 metres) (metres/second)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3.1 At 7 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3.2 At 13 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
4 Unable to 'tandem stand' (postural instability)	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
4.1 At 7 weeks	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4.2 At 13 weeks	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5 Pain (6 point scale: 6 = constant severe pain)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
5.1 At 7 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.2 At 13 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
6 Mortality	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected

7 Barthel Index (disability): 20 point scale		Other data	No numeric data
8 Nottingham Health Profile (health status)		Other data	No numeric data
9 Leg extensor power: change from baseline (watts)	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
9.1 Fractured leg at 6 weeks	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.2 Non-fractured leg at 6 weeks	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.3 Fractured leg at 14 weeks	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.4 Non-fractured leg at 14 weeks	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
10 Leg extensor power (watts/kilogram)	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
10.1 Fractured leg at 7 weeks	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
10.2 Non-fractured leg at 7 weeks	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
10.3 Fractured leg at 13 weeks	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
10.4 Non-fractured leg at 13 weeks	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable

Comparison 8. Electrical stimulation (pain alleviation) versus placebo stimulation

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Effect of pain on walking ability (1: no interference; 10: complete interference)			Other data	No numeric data
2 Overall assessment of outcome by an orthopaedic surgeon	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
2.1 Average or better recovery at 10 days	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.2 Full or substantial recovery at 10 days	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3 Range of motion: hip flexion (degrees)			Other data	No numeric data

Comparison 9. Resistance training for 12 weeks versus attention control

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 SF-12 physical component			Other data	No numeric data
2 Gait speed at 12 weeks			Other data	No numeric data
3 Mortality	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
3.1 At 12 weeks	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3.2 At 12 months (hip fracture)	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4 Hospital readmission	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
4.1 At 12 weeks	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4.2 At 12 months	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5 Admitted to higher level of care (12 weeks)	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
5.1 Higher level of care in survivors	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.2 Higher level of care or dead	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6 SF-12 mental component			Other data	No numeric data
7 Quadriceps strength (kg)			Other data	No numeric data
8 Length of stay (in days)			Other data	No numeric data

Comparison 10. Resistance training for 12 weeks + nutrition intervention versus attention control

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 SF-12 physical component			Other data	No numeric data
2 Gait speed at 12 weeks			Other data	No numeric data
3 Mortality	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
3.1 At 12 weeks	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3.2 At 12 months (hip fracture)	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4 Hospital readmission	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
4.1 At 12 weeks	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4.2 At 12 months	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5 Admitted to higher level of care (12 weeks)	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
5.1 Higher level of care in survivors	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.2 Higher level of care or dead	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6 SF-12 mental component			Other data	No numeric data
7 Quadriceps strength (kg)			Other data	No numeric data
8 Length of stay (in days)			Other data	No numeric data

Comparison 11. High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Mobility at 16 weeks	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
1.1 Unable to walk unaided or with sticks or crutches	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.2 Poor or fair self-rated mobility	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2 Physical Performance and Mobility Examination score (0: failure to 12: top score) at 16 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3 Walking speed (m/sec) at 16 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4 Functional performance tests: stand to sit (stand-ups/sec)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
5 Balance at 16 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
5.1 Step test fractured leg (steps)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.2 Maximum balance range (mm)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
6 Subjective rating of pain, balance, strength at 16 weeks	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
6.1 Some, moderate or severe pain	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.2 Poor or fair balance only	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.3 Poor or fair strength only	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7 Mortality and hospital readmission at 16 weeks	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
7.1 Mortality	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.2 Readmission during study	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8 Fell at least once during study (16 weeks)	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
9 Barthel index at 16 weeks			Other data	No numeric data
10 Residence and user of community services at 16 weeks	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
10.1 In hostel, nursing home or hospital	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.2 User of community services	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
11 EQ-5D (0 to 1: best quality of life) at 16 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
12 Knee extensor strength, fractured leg (kg) at 16 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected

13 Participant reported negative effects (e.g. joint or muscle pain, general pain, tiredness etc)	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
13.1 At 4 weeks	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
13.2 At 16 weeks	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
14 Length of inpatient rehabilitation (days)	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected

Comparison 12. Intensive physical training versus placebo activities (started post-discharge)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Tinetti's POMA (Performance Orientated Mobility Assessment)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
1.1 Overall POMA (0 to 30. higher = better)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.2 POMA part 1 (balance: 0 to 15)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.3 POMA part 2 (gait: 0 to 15)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
2 Gait parameters	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
2.1 Walking velocity (metres/second)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
2.2 Box step fractured leg (cm)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
2.3 Box step non-fractured leg (cm)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3 Functional performance tests	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3.1 Timed up-and-go (seconds)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3.2 Chair rise (seconds)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3.3 Stair rise (seconds)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
4 Balance	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4.1 Balance score (0 to 20 (20 successful tests))	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
4.2 Functional reach (cm)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
5 Subjective/emotional state assessment, falls, balance and general	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
5.1 Fall Handicap Inventory (0 to 72: highest disability)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.2 Fear of falling	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.3 Walking unsteadiness	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.4 Geriatric Depression Scale (0 to 30: very depressed)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
6 Loss of social independence	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected

7 Functional performance measures	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
7.1 Barthel's ADL (activities of daily living) (0 to 100: fully independent)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.2 Lawton's IADL (instrumental activities of daily living) (0 to 8: fully competent)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.3 Total activity	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.4 'Sports' activities	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.5 Household activities	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8 Strength measures	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
8.1 Leg-press fractured side (kg)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.2 Leg-press non-fractured side (kg)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.3 Leg extensor fractured side (Newtons)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.4 Leg extensor fractured side (Newtons)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.5 Leg flexor fractured side (Newtons)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.6 Leg flexor non-fractured side (Newtons)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.7 Ankle plantar flexion fractured side (Newtons)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.8 Ankle plantar flexion non-fractured side (Newtons)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8.9 Hand grip both hands (KPa)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9 Adherence	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected

Comparison 13. Home-based physical therapy versus unsupervised home exercise programme

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Functional status	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
1.1 Harris hip score at 3 months (range 0: worst to 100: best function)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.2 Harris hip score at 6 months (range 0: worst to 100: best function)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
2 Quality of life	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
2.1 WHOQOL-BREF physical health score at 3 months (highest score = 20)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable

2.2 WHOQOL-BREF psychological at 3 months (highest score = 20)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
2.3 WHOQOL-BREF physical health score at 6 months (highest score = 20)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
2.4 WHOQOL-BREF psychological at 6 months (highest score = 20)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
3 Gait: walking speed (metres/minute)	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4 Complications	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
4.1 Wound infection	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4.2 Refracture	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4.3 GI tract bleed	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5 Strength at six months	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
5.1 Hip flexor strength (Newtons)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.2 Hip extensor strength (Newtons)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.3 Hip abductor strength (Newtons)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.4 Knee extensor strength (Newtons)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
6 Range of motion: Hip flexion range (degrees)	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected

Comparison 14. Home-based supervised exercise programme (+/- motivational interventions) versus usual care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Activity levels: hours of exercise per weeks at 12 months from injury	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
1.1 Exercises only	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.2 Exercises + motivation	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
2 Activity levels: number of steps over 48 hours (12 months from injury)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
2.1 Exercises only	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3 Mortality	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
3.1 Exercises only	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3.2 Exercises + motivation	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4 Refusal to participate in study or measurement (12 months from injury)	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
4.1 Exercises only	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4.2 Exercises + motivation	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

Comparison 15. Supervised intensive physical therapy and exercise training versus low-intensity home exercise

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Modified Physical Performance Test score at 6 months (0: worst to 36: best)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
2 Assistive device continued to be required	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
3 Gait: fast walking speed (metres/minute)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4 Balance at 6 months	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4.1 Single limb stance time fractured side (seconds)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
4.2 Berg Balance Score (0 to 56: best)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
5 Participant withdrawal from study	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
6 Functional status and activities of daily living at 6 months	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
6.1 Functional Status Questionnaire score (0 to 36: best)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
6.2 Instrumental ADL score (0 to 14: fully competent)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
6.3 Basic ADL score (0 to 14: fully independent)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
7 Quality of life at 6 months	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
7.1 SF-36 Physical Function subscale (0 to 100: best)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.2 SF-36 Social Function subscale (0 to 100: best)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.3 Hip Rating Questionnaire Score (0 to 100: best)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
8 Strength: knee extension on fractured side (feet/pound)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected

Comparison 16. Home-based high-intensity resistance or aerobic training versus control

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Gait at 12 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
1.1 Free gait speed (metres/second)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.2 6-minute walk distance (metres)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable

2 Functional ability: SF-36 Physical function (0 to 100: best)	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3 Strength: maximum voluntary isometric force of the lower extremity (kg)	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected

Comparison 17. Home-based high-intensity resistance training versus control

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Gait at 12 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
1.1 Free gait speed (metres/second)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.2 6-minute walk distance (metres)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
2 Functional ability: SF-36 Physical function (0 to 100: best)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3 Strength: maximum voluntary isometric force of the lower extremity (kg)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected

Comparison 18. Home-based aerobic training versus control

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Gait at 12 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
1.1 Free gait speed (metres/second)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.2 6-minute walk distance (metres)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
2 Functional ability: SF-36 Physical function (0 to 100: best)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3 Strength: maximum voluntary isometric force of the lower extremity (kg)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected

Comparison 19. Home-based high-intensity resistance training versus aerobic training

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Gait at 12 weeks	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
1.1 Free gait speed (metres/second)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.2 6-minute walk distance (metres)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
2 Functional ability: SF-36 Physical function (0 to 100: best)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3 Strength: maximum voluntary isometric force of the lower extremity (kg)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected

Comparison 20. Home-based exercises programme (started at 22 weeks) versus control

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Mobility	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
1.1 Cannot walk indoors unaided	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.2 Cannot walk outdoors unaided	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.3 Does not walk for exercise	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.4 Unable to walk 800m	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.5 Unable to climb flight of stairs	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.6 Unable to do heavy housework	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.7 Does not participate in sports	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2 Physical Performance and Mobility Examination score (0:failure to 12:top score)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3 Gait parameters	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3.1 Time to walk 6m at a comfortable pace (s) (Effect direction: Favours exercises: Favours control)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3.2 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours control: Favours exercises)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable

3.3 Time to walk 6m at a fast pace (s) (Effect direction: Favours exercises: Favours control)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
3.4 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours control: Favours exercises)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
4 Functional performance tests	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4.1 Timed sit-to-stand x5 (seconds)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
4.2 Timed supine-to-sit (seconds)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5 Balance	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
5.1 Step test fractured leg (steps) (Effect direction: Favours control: Favours exercises)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.2 Step test non-fractured leg (steps) (Effect direction: Favours control: Favours exercises)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.3 Functional reach (cm) (Effect direction: Favours control: Favours exercises)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.4 Sway distance floor (mm) (Effect direction: Favours exercises: Favours control)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.5 Sway distance foam (mm) (Effect direction: Favours exercises: Favours control)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
6 Subjective rating of pain, fall risk, balance, sleep quality and general health	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
6.1 Moderate or worse pain	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.2 Considered themselves as at moderate or high risk of falling	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.3 Unsteady balance	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.4 Sleep quality: not good	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.5 Only good or worse general health	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7 Fell at least once during intervention period (4 months)	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
8 Mortality	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
9 Strength measures (newtons)	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
9.1 Hip abduction fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.2 Hip abduction non-fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.3 Hip flexion fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable

9.4 Hip flexion non-fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.5 Knee extension fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.6 Knee extension non-fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable

Comparison 21. Home-based weight bearing exercises programme (started at 22 weeks) versus control

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Mobility	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
1.1 Cannot walk indoors unaided	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.2 Cannot walk outdoors unaided	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.3 Does not walk for exercise	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.4 Unable to walk 800m	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.5 Unable to climb flight of stairs	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.6 Unable to do heavy housework	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.7 Does not participate in sports	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2 Physical Performance and Mobility Examination score (0:failure to 12:top score)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3 Gait parameters	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3.1 Time to walk 6m at a comfortable pace (s) (Effect direction: Favours exercises: Favours control)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3.2 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours control: Favours exercises)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3.3 Time to walk 6m at a fast pace (s) (Effect direction: Favours exercises: Favours control)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3.4 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours control: Favours exercises)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
4 Functional performance tests	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4.1 Timed sit-to-stand x5 (seconds)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable

4.2 Timed supine-to-sit (seconds)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5 Balance	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
5.1 Step test fractured leg (steps) (Effect direction: Favours control: Favours exercises)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.2 Step test non-fractured leg (steps) (Effect direction: Favours control: Favours exercises)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.3 Functional reach (cm) (Effect direction: Favours control: Favours exercises)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.4 Sway distance floor (mm) (Effect direction: Favours exercises: Favours control)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.5 Sway distance foam (mm) (Effect direction: Favours exercises: Favours control)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
6 Subjective rating of pain, fall risk, balance, sleep quality and general health	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
6.1 Moderate or worse pain	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.2 Considered themselves as at moderate or high risk of falling	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.3 Unsteady balance	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.4 Sleep quality: not good	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.5 Only good or worse general health	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7 Fell at least once during intervention period (4 months)	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
8 Mortality	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
9 Strength measures (newtons)	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
9.1 Hip abduction fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.2 Hip abduction non-fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.3 Hip flexion fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.4 Hip flexion non-fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.5 Knee extension fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.6 Knee extension non-fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable

Comparison 22. Home-based non-weight bearing exercises programme (started 22 at weeks) versus control

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Mobility	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
1.1 Cannot walk indoors unaided	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.2 Cannot walk outdoors unaided	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.3 Does not walk for exercise	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.4 Unable to walk 800m	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.5 Unable to climb flight of stairs	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.6 Unable to do heavy housework	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.7 Does not participate in sports	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2 Physical Performance and Mobility Examination score (0:failure to 12:top score)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3 Gait parameters	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3.1 Time to walk 6m at a comfortable pace (s) (Effect direction: Favours exercises: Favours control)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3.2 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours control: Favours exercises)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3.3 Time to walk 6m at a fast pace (s) (Effect direction: Favours exercises: Favours control)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3.4 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours control: Favours exercises)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
4 Functional performance tests	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4.1 Timed sit-to-stand x5 (seconds)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
4.2 Timed supine-to-sit (seconds)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
5 Balance	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
5.1 Step test fractured leg (steps) (Effect direction: Favours control: Favours exercises)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable

5.2 Step test non-fractured leg (steps) (Effect direction: Favours control: Favours exercises)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.3 Functional reach (cm) (Effect direction: Favours control: Favours exercises)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.4 Sway distance floor (mm) (Effect direction: Favours exercises: Favours control)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.5 Sway distance foam (mm) (Effect direction: Favours exercises: Favours control)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
6 Subjective rating of pain, fall risk, balance, sleep quality and general health	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
6.1 Moderate or worse pain	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.2 Considered themselves as at moderate or high risk of falling	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.3 Unsteady balance	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.4 Sleep quality: not good	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.5 Only good or worse general health	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7 Fell at least once during intervention period (4 months)	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
8 Mortality	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
9 Strength measures (newtons)	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
9.1 Hip abduction fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.2 Hip abduction non-fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.3 Hip flexion fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.4 Hip flexion non-fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.5 Knee extension fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.6 Knee extension non-fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable

Comparison 23. Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Mobility	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
1.1 Cannot walk indoors unaided	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

1.2 Cannot walk outdoors unaided	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.3 Does not walk for exercise	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.4 Unable to walk 800m	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.5 Unable to climb flight of stairs	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.6 Unable to do heavy housework	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.7 Does not participate in sports	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2 Physical Performance and Mobility Examination score (0:failure to 12:top score)	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3 Gait parameters	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3.1 Time to walk 6m at a comfortable pace (s) (Effect direction: Favours weight-bear: Favours non-w-bear)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
3.2 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours non-w-bear: Favours weight-bear)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
3.3 Time to walk 6m at a fast pace (s) (Effect direction: Favours weight-bear: Favours non-w-bear)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
3.4 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours non-w-bear: Favours weight-bear)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
4 Functional performance tests	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4.1 Timed sit-to-stand x5 (seconds)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
4.2 Timed supine-to-sit (seconds)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5 Balance	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
5.1 Step test fractured leg (steps) (Effect direction: Favours non-w-bear: Favours weight-bear)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.2 Step test non-fractured leg (steps) (Effect direction: Favours non-w-bear: Favours weigh-bear)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.3 Functional reach (cm) (Effect direction: Favours non-w-bear: Favours weight-bear)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable

5.4 Sway distance floor (mm) (Effect direction: Favours weight-bear: Favours non-w-bear)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.5 Sway distance foam (mm) (Effect direction: Favours weight-bear: Favours non-w-bear)	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
6 Subjective rating of pain, fall risk, balance, sleep quality and general health	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
6.1 Moderate or worse pain	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.2 Considered themselves as at moderate or high risk of falling	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.3 Unsteady balance	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.4 Sleep quality: not good	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.5 Only good or worse general health	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7 Fell at least once during intervention period (4 months)	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
8 Mortality	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
9 Strength measures (newtons)	1	Mean Difference (IV, Fixed, 95% CI)	Totals not selected
9.1 Hip abduction fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.2 Hip abduction non-fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.3 Hip flexion fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.4 Hip flexion non-fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.5 Knee extension fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.6 Knee extension non-fractured leg	1	Mean Difference (IV, Fixed, 95% CI)	Not estimable
10 Participant's participation in and perception of exercise programmes	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
10.1 Had difficulty with exercises	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.2 Experienced moderate or marked pain during exercise	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.3 Exercises not considered even of moderate usefulness	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.4 Had stopped exercises altogether (by 4 months)	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.5 Exercises done less than 3 times weekly or not at all (by 4 months)	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

Comparison 24. Home-based exercises programme (started at 7 months)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Inability to perform weight-bearing test without hand support	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
1.1 Use of 5.5 cm block: fractured leg	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.2 Use of 5.5 cm block: non-fractured leg	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.3 Use of 10.5 cm block: fractured leg	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.4 Use of 10.5 cm block: fractured leg	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2 Gait parameters	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
2.1 Velocity (m/sec)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
2.2 Cadence: steps/minute	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3 Subjective rating of balance and fall risk	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
3.1 Balance: not always steady	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3.2 Self-perceived moderate or high risk of fall	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4 Balance (postural control)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4.1 Sway on floor (mm) (Effect direction: Favours exercises: Favours control)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
4.2 Sway on foam (mm) (Effect direction: Favours exercises: Favours control)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
4.3 Functional reach (cm) (Effect direction: Favours control: Favours exercises)	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
5 Strength (kg)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
5.1 Quadriceps fractured leg	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
5.2 Quadriceps non-fractured leg	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable

Analysis 1.1. Comparison 1 Early (< 48 hours) versus delayed (> 48 hours) assisted ambulation after surgery, Outcome 1 Time to first walk.

Time to first walk

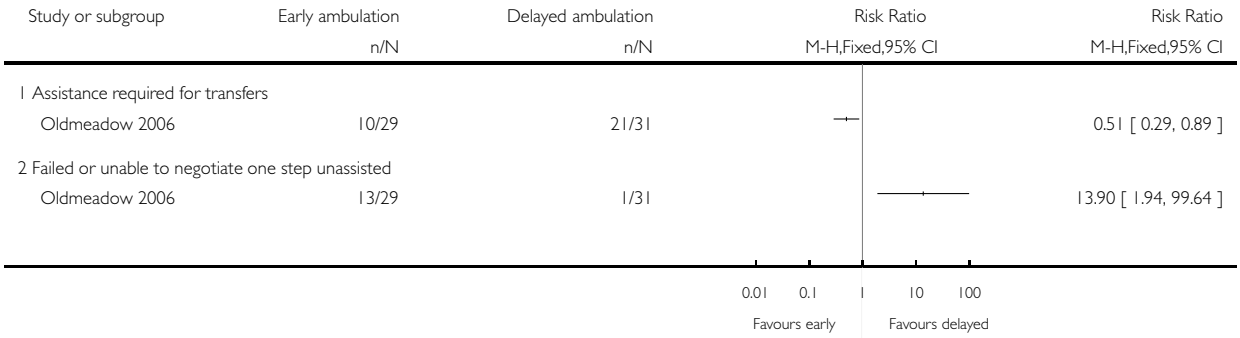
Study	Measure	Early ambulation	Delayed ambulation	Reported significance	Comment
Oldmeadow 2006	Time to first walk (days)	Mean = 2.38 Range = 1 to 6 n = 29	Mean = 3.74 Range = 3 to 11 n = 31‘	P = 0.001	10 early ambulators did not start until after 48 hours.

Analysis 1.2. Comparison 1 Early (< 48 hours) versus delayed (> 48 hours) assisted ambulation after surgery, Outcome 2 Poor functional mobility at 7 days.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 1 Early (< 48 hours) versus delayed (> 48 hours) assisted ambulation after surgery

Outcome: 2 Poor functional mobility at 7 days



Analysis 1.3. Comparison 1 Early (< 48 hours) versus delayed (> 48 hours) assisted ambulation after surgery, Outcome 3 Mean walking distance at 7 days (metres).

Mean walking distance at 7 days (metres)

Study	Measure	Early ambulation	Delayed ambulation	Reported significance
Oldmeadow 2006	Walking distance (metres)	Mean = 66.05 Range = 0.5 to 400 n = 29	Mean = 29.71 Range = 0 to 150 n = 31	P = 0.03

Analysis 1.4. Comparison 1 Early (< 48 hours) versus delayed (> 48 hours) assisted ambulation after surgery, Outcome 4 Mortality and cardiovascular challenged participants.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 1 Early (< 48 hours) versus delayed (> 48 hours) assisted ambulation after surgery

Outcome: 4 Mortality and cardiovascular challenged participants

Study or subgroup	Early ambulation n/N	Delayed ambulation n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Dead before discharge				
Oldmeadow 2006	1/29	0/31		3.20 [0.14, 75.55]
2 Positive troponin test				
Oldmeadow 2006	8/29	6/31		1.43 [0.56, 3.61]

Analysis 1.5. Comparison 1 Early (< 48 hours) versus delayed (> 48 hours) assisted ambulation after surgery, Outcome 5 Discharge location.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 1 Early (< 48 hours) versus delayed (> 48 hours) assisted ambulation after surgery

Outcome: 5 Discharge location

Study or subgroup	Early ambulation n/N	Delayed ambulation n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Discharge to nursing home				
Oldmeadow 2006	1/29	0/31		3.20 [0.14, 75.55]
2 Dead or discharge to rehabilitation facility or nursing home				
Oldmeadow 2006	24/29	30/31		0.86 [0.72, 1.02]

Analysis 1.6. Comparison 1 Early (< 48 hours) versus delayed (> 48 hours) assisted ambulation after surgery, Outcome 6 Length of hospital stay.

Length of hospital stay

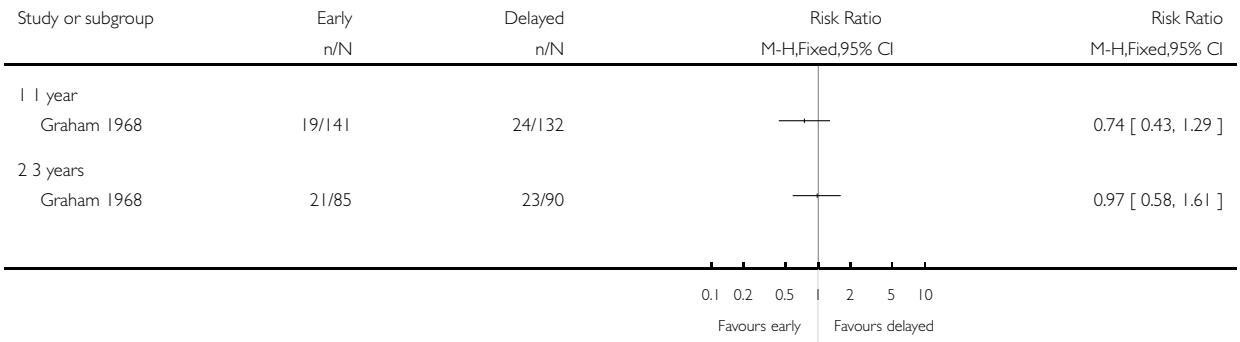
Study	Measure	Early ambulation	Delayed ambulation	Reported significance	Comment
Oldmeadow 2006	Length of stay in acute care (days)	Mean = 16.62 Range = 4 to 136 n = 29	Mean = 11.39 Range = 5 to 24 n = 31	P = 0.24	Removal of outlier (136 days in hospital) in the early ambulation group gives a mean of 12.35 days (range 4 to 33 days)

Analysis 2.1. Comparison 2 Early (2 weeks) versus delayed (12 weeks) weight bearing, Outcome 1 Mortality.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 2 Early (2 weeks) versus delayed (12 weeks) weight bearing

Outcome: 1 Mortality

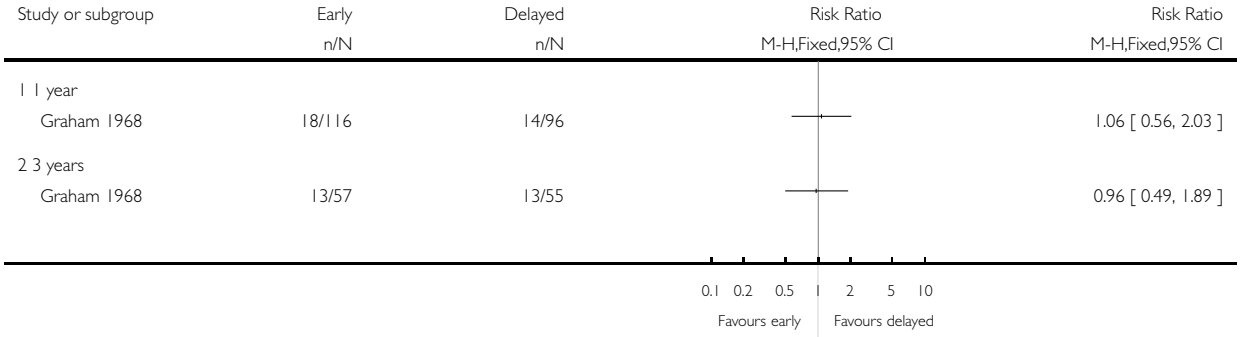


Analysis 2.2. Comparison 2 Early (2 weeks) versus delayed (12 weeks) weight bearing, Outcome 2 Non-union (fixation failure).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 2 Early (2 weeks) versus delayed (12 weeks) weight bearing

Outcome: 2 Non-union (fixation failure)

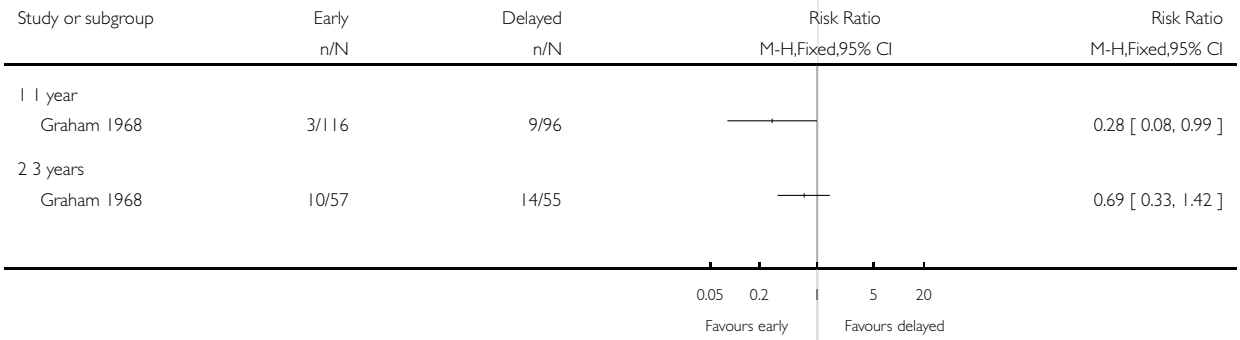


Analysis 2.3. Comparison 2 Early (2 weeks) versus delayed (12 weeks) weight bearing, Outcome 3 Avascular necrosis.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 2 Early (2 weeks) versus delayed (12 weeks) weight bearing

Outcome: 3 Avascular necrosis

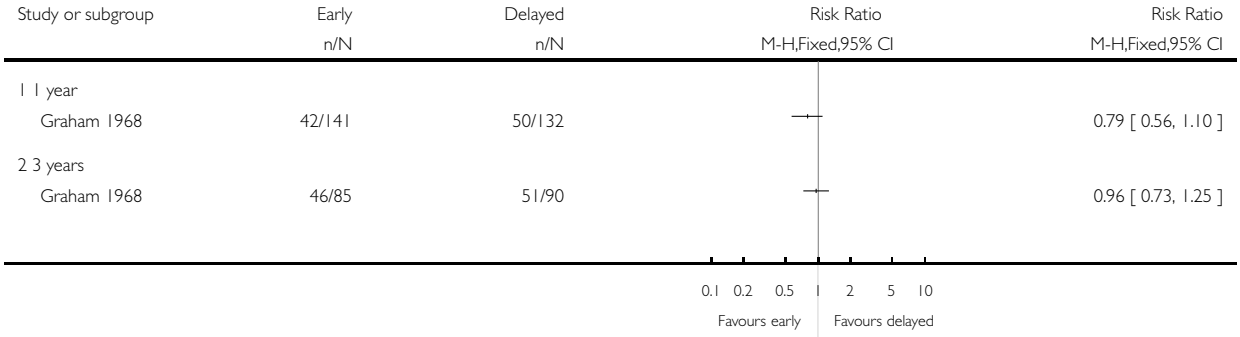


Analysis 2.4. Comparison 2 Early (2 weeks) versus delayed (12 weeks) weight bearing, Outcome 4 Unfavourable outcome (death, failure or infection).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 2 Early (2 weeks) versus delayed (12 weeks) weight bearing

Outcome: 4 Unfavourable outcome (death, failure or infection)

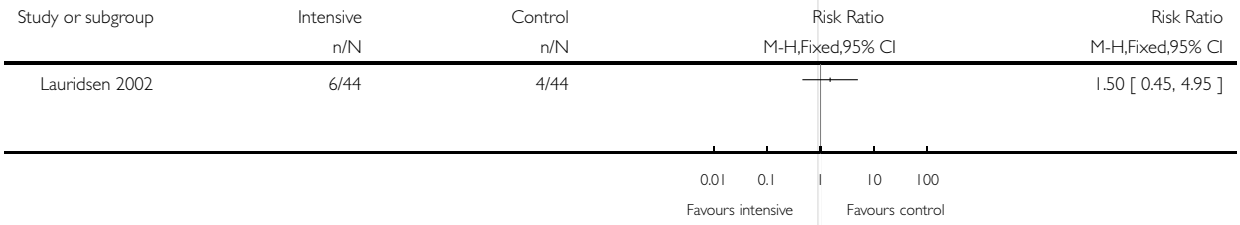


Analysis 3.1. Comparison 3 Intensive versus usual physiotherapy, Outcome 1 Orthopaedic complication (as reason for withdrawal from trial).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 3 Intensive versus usual physiotherapy

Outcome: 1 Orthopaedic complication (as reason for withdrawal from trial)



Analysis 3.2. Comparison 3 Intensive versus usual physiotherapy, Outcome 2 Adductor muscle strength (kp) at 9 weeks.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 3 Intensive versus usual physiotherapy

Outcome: 2 Adductor muscle strength (kp) at 9 weeks

Study or subgroup	Intensive N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Fractured leg						
Karumo 1977	38	5.26 (4.08)	49	6.02 (3.69)		-0.76 [-2.42, 0.90]
2 Non-fractured leg						
Karumo 1977	38	7.6 (4.09)	49	7.08 (3.69)		0.52 [-1.14, 2.18]

Analysis 3.3. Comparison 3 Intensive versus usual physiotherapy, Outcome 3 Non-completion of training programme.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 3 Intensive versus usual physiotherapy

Outcome: 3 Non-completion of training programme

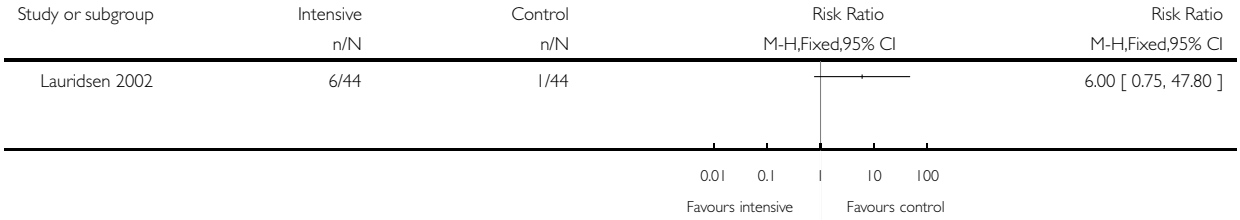
Study or subgroup	Intensive n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
Lauridsen 2002	24/44	13/44		1.85 [1.09, 3.14]

Analysis 3.4. Comparison 3 Intensive versus usual physiotherapy, Outcome 4 Withdrawal from trial by patient.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 3 Intensive versus usual physiotherapy

Outcome: 4 Withdrawal from trial by patient



Analysis 3.5. Comparison 3 Intensive versus usual physiotherapy, Outcome 5 Training intensity and duration.

Training intensity and duration

Study	**Measure**	**Intensive physiotherapy**	**Control**	**Reported significance**	**Comment**
Lauridsen 2002	Total hours spent training	Median = 6.4 Range = 1.3 to 21.3 n = 44	Median = 4.0 Range = 0.3 to 12.5 n = 44	P (1 sided) = 0.001	Intention-to-treat analysis
Lauridsen 2002	Training intensity (hours/day)	Median = 0.5 Range = 0.1 to 9.7* n = 44 * this is probably an error in the table	Median = 0.2 Range = 0.1 to 0.6 n = 31	P (1 sided) = 0.000005	Intention-to-treat analysis

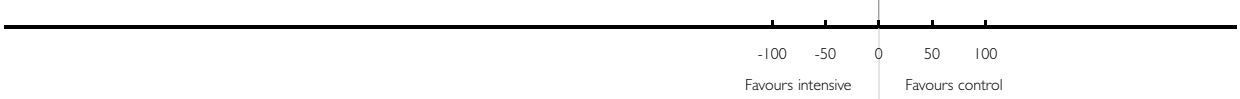
Analysis 3.6. Comparison 3 Intensive versus usual physiotherapy, Outcome 6 Length of hospital stay (days).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 3 Intensive versus usual physiotherapy

Outcome: 6 Length of hospital stay (days)

Study or subgroup	Intensive N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Karumo 1977	38	32.21 (22.03)	49	35.01 (21.8)		-2.80 [-12.09, 6.49]



Analysis 3.7. Comparison 3 Intensive versus usual physiotherapy, Outcome 7 Length of hospital stay.

Length of hospital stay

Study	**Measure**	**Intensive physiotherapy**	**Control**	**Reported significance**	**Comment**
Lauridsen 2002	Length of hospital stay (days)	Median = 32 Range = 5 to 126 n = 44	Median = 34 Range = 8 to 145 n = 44	P (1 sided) = 0.4	Intention -to-treat analysis
Lauridsen 2002	Length of hospital stay (days)	Median = 25 Range = 9 to 41 n = 20	Median = 33 Range = 8 to 101 n = 31	P (1 sided) = 0.03	Per protocol analysis for participants completing the training regimen

Analysis 4.1. Comparison 4 Weight-bearing exercises versus non-weight-bearing exercises, Outcome 1 Unable to walk at all or without two sticks or a frame.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 4 Weight-bearing exercises versus non-weight-bearing exercises

Outcome: 1 Unable to walk at all or without two sticks or a frame

Study or subgroup	Weight-bear n/N	Non-weight-bear n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Unable to walk at all				
Sherrington 2003	4/41	7/39		0.54 [0.17, 1.71]
2 Unable to walk unaided or with one stick alone				
Sherrington 2003	33/41	37/39		0.85 [0.72, 1.00]

Analysis 4.2. Comparison 4 Weight-bearing exercises versus non-weight-bearing exercises, Outcome 2 Unable to do a lateral step-up unsupported or with one hand alone.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 4 Weight-bearing exercises versus non-weight-bearing exercises

Outcome: 2 Unable to do a lateral step-up unsupported or with one hand alone

Study or subgroup	Weight-bear n/N	Non-weight-bear n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Fractured leg				
Sherrington 2003	18/40	30/37		0.56 [0.38, 0.81]
2 Non-fractured leg				
Sherrington 2003	14/40	16/37		0.81 [0.46, 1.42]

Analysis 4.3. Comparison 4 Weight-bearing exercises versus non-weight-bearing exercises, Outcome 3 Physical Performance and Mobility Examination score (0: failure to 12: top score).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 4 Weight-bearing exercises versus non-weight-bearing exercises

Outcome: 3 Physical Performance and Mobility Examination score (0: failure to 12: top score)

Study or subgroup	Weight-bear N	Mean(SD)	Non-weight-bear N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Sherrington 2003	40	7.5 (2.7)	37	6.8 (2.8)		0.70 [-0.53, 1.93]

Analysis 4.4. Comparison 4 Weight-bearing exercises versus non-weight-bearing exercises, Outcome 4 Gait parameters.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 4 Weight-bearing exercises versus non-weight-bearing exercises

Outcome: 4 Gait parameters

Study or subgroup	Weight-bear N	Mean(SD)	Non-weight-bear N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Velocity (m/sec)						
Sherrington 2003	40	0.25 (0.22)	37	0.19 (0.2)		0.06 [-0.03, 0.15]
2 Steps per second						
Sherrington 2003	40	0.91 (0.58)	37	0.71 (0.42)		0.20 [-0.02, 0.42]

Analysis 4.5. Comparison 4 Weight-bearing exercises versus non-weight-bearing exercises, Outcome 5 Balance.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 4 Weight-bearing exercises versus non-weight-bearing exercises

Outcome: 5 Balance

Study or subgroup	Weight-bear N	Mean(SD)	Non-weight-bear N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Functional reach distance (cm)						
Sherrington 2003	40	11.5 (9.2)	37	9.4 (7.5)		2.10 [-1.64, 5.84]
2 Step test fractured leg (reps)						
Sherrington 2003	40	1.3 (3.1)	37	0.5 (1.4)		0.80 [-0.26, 1.86]
3 Step test non-fractured leg (reps)						
Sherrington 2003	40	3.7 (4.3)	37	2.1 (2.8)		1.60 [-0.01, 3.21]

Analysis 4.6. Comparison 4 Weight-bearing exercises versus non-weight-bearing exercises, Outcome 6 Subjective rating of pain, fall risk, balance, sleep quality and general health.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 4 Weight-bearing exercises versus non-weight-bearing exercises

Outcome: 6 Subjective rating of pain, fall risk, balance, sleep quality and general health

Study or subgroup	Weight-bear n/N	Non-weight-bear n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Serious activity-inhibiting pain				
Sherrington 2003	12/40	10/37		1.11 [0.55, 2.26]
2 Considered themselves as at moderate or high risk of falling				
Sherrington 2003	26/40	27/37		0.89 [0.66, 1.20]
3 Unsteady balance				
Sherrington 2003	29/40	32/37		0.84 [0.67, 1.05]
4 Sleep quality: 'OK' at most				
Sherrington 2003	27/40	25/37		1.00 [0.73, 1.36]
5 Only good or worse general health				
Sherrington 2003	26/40	29/37		0.83 [0.62, 1.10]

Analysis 4.7. Comparison 4 Weight-bearing exercises versus non-weight-bearing exercises, Outcome 7 Fracture fixation problems.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 4 Weight-bearing exercises versus non-weight-bearing exercises

Outcome: 7 Fracture fixation problems

Study or subgroup	Weight-bear n/N	Non-weight-bear n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
Sherrington 2003	0/41	2/39		0.19 [0.01, 3.85]

Analysis 4.8. Comparison 4 Weight-bearing exercises versus non-weight-bearing exercises, Outcome 8 Strength measures (newtons).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 4 Weight-bearing exercises versus non-weight-bearing exercises

Outcome: 8 Strength measures (newtons)

Study or subgroup	Weight-bear N	Mean(SD)	Non-weight-bear N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Hip abduction fractured leg						
Sherrington 2003	40	24.6 (17.6)	37	22.5 (10)		2.10 [-4.23, 8.43]
2 Hip abduction non-fractured leg						
Sherrington 2003	40	42.6 (21.2)	37	41 (17)		1.60 [-6.95, 10.15]
3 Hip flexion fractured leg						
Sherrington 2003	40	17.7 (9.4)	37	17.2 (11.6)		0.50 [-4.24, 5.24]
4 Hip flexion non-fractured leg						
Sherrington 2003	40	37.9 (21.9)	37	35.8 (19.5)		2.10 [-7.15, 11.35]
5 Knee extension fractured leg						
Sherrington 2003	40	65.5 (30.1)	37	67.9 (36)		-2.40 [-17.29, 12.49]
6 Knee extension non-fractured leg						
Sherrington 2003	40	118.7 (61.7)	37	109.1 (50.8)		9.60 [-15.57, 34.77]

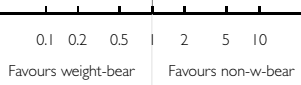
Analysis 4.9. Comparison 4 Weight-bearing exercises versus non-weight-bearing exercises, Outcome 9 Participant's perception of exercise programmes.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 4 Weight-bearing exercises versus non-weight-bearing exercises

Outcome: 9 Participant's perception of exercise programmes

Study or subgroup	Weight-bear n/N	Non-weight-bear n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Had difficulty with exercises				
Sherrington 2003	14/40	12/37		1.08 [0.58, 2.02]
2 Experienced moderate or marked pain during exercise				
Sherrington 2003	17/40	18/37		0.87 [0.54, 1.43]
3 Exercises not considered even of moderate usefulness				
Sherrington 2003	12/40	7/37		1.59 [0.70, 3.59]



Analysis 4.10. Comparison 4 Weight-bearing exercises versus non-weight-bearing exercises, Outcome 10 Total length of stay in hospital (days).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 4 Weight-bearing exercises versus non-weight-bearing exercises

Outcome: 10 Total length of stay in hospital (days)

Study or subgroup	Weight-bear N	Mean(SD)	Non-weight-bear N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Sherrington 2003	41	36.2 (13.6)	39	38.5 (16.3)		-2.30 [-8.90, 4.30]

Analysis 5.1. Comparison 5 Quadriceps training programme versus conventional physiotherapy alone, Outcome 1 Functional mobility (Elderly Mobility Scale).

Functional mobility (Elderly Mobility Scale)

Study	Measure	Quadriceps exercises	Control	Reported significance	Comment
Mitchell 2001	Elderly Mobility Scale At 6 weeks	Median = 17.5 IQR = 16 to 20 n = 30	Median = 16 IQR = 14.75 to 18 n = 29	P < 0.001	Scale 20 points
Mitchell 2001	Elderly Mobility Scale At 16 weeks	Median = 18 IQR = 16 to 20 n = 20	Median = 17 IQR = 15.25 to 19.5 n = 24	P = 0.026	

Analysis 5.2. Comparison 5 Quadriceps training programme versus conventional physiotherapy alone, Outcome 2 Gait speed (metres / second).

Gait speed (metres / second)

Study	Measure	Quadriceps exercises	Control	Reported significance
Mitchell 2001	Gait speed At 6 weeks	Median = 0.29 IQR = 0.21 to 0.46 n = 30	Median = 0.28 IQR = 0.21 to 0.45 n = 29	Not statistically significant
Mitchell 2001	Gait speed At 16 weeks	Median = 0.38 IQR = 0.27 to 0.55 n = 20	Median = 0.42 IQR = 0.21 to 0.66 n = 24	Not statistically significant

Analysis 5.3. Comparison 5 Quadriceps training programme versus conventional physiotherapy alone, Outcome 3 Timed up and go (seconds).

Timed up and go (seconds)

Study	Measure	Quadriceps exercises	Control	Reported significance
Mitchell 2001	Timed up and go At 6 weeks	Median = 36.0 IQR = 21.7 to 55.0 n = 30	Median = 36.3 IQR = 22.3 to 51.8 n = 29	Not statistically significant
Mitchell 2001	Timed up and go At 16 weeks	Median = 23.5 IQR = 15.0 to 43.8 n = 20	Median = 28.8 IQR = 16.7 to 38.5 n = 24	Not statistically significant

Analysis 5.4. Comparison 5 Quadriceps training programme versus conventional physiotherapy alone, Outcome 4 Functional reach (inches).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 5 Quadriceps training programme versus conventional physiotherapy alone

Outcome: 4 Functional reach (inches)

Study or subgroup	Quadriceps exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 At 6 weeks						
Mitchell 2001	30	6.5 (2.19)	29	5 (2.15)		1.50 [0.39, 2.61]
2 At 16 weeks						
Mitchell 2001	20	6.8 (1.79)	29	5.5 (2.45)		1.30 [0.11, 2.49]

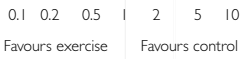
Analysis 5.5. Comparison 5 Quadriceps training programme versus conventional physiotherapy alone, Outcome 5 Mortality.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 5 Quadriceps training programme versus conventional physiotherapy alone

Outcome: 5 Mortality

Study or subgroup	Quadriceps exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
Mitchell 2001	4/40	3/40		1.33 [0.32, 5.58]

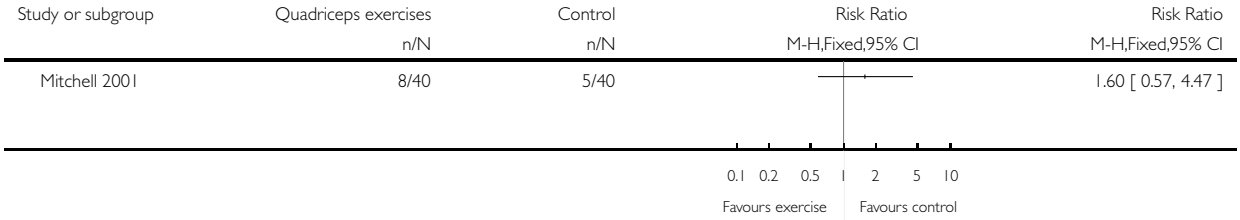


Analysis 5.6. Comparison 5 Quadriceps training programme versus conventional physiotherapy alone, Outcome 6 New comorbidity at follow-up.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 5 Quadriceps training programme versus conventional physiotherapy alone

Outcome: 6 New comorbidity at follow-up



Analysis 5.7. Comparison 5 Quadriceps training programme versus conventional physiotherapy alone, Outcome 7 Barthel Index (disability): 20 point scale.

Barthel Index (disability): 20 point scale

Study	Measure	Quadriceps exercises	Control	Reported significance
Mitchell 2001	Barthel Index At 6 weeks	Median = 18 IQR = 18 to 19 n = 30	Median = 18 IQR = 16.5 to 18 n = 29	P < 0.05
Mitchell 2001	Barthel Index At 16 weeks	Median = 19 IQR = 18 to 19 n = 20	Median = 18 IQR = 18 to 19 n = 24	Not statistically significant

Analysis 5.8. Comparison 5 Quadriceps training programme versus conventional physiotherapy alone, Outcome 8 Nottingham Health Profile (health status).

Nottingham Health Profile (health status)

Study	Measure	Quadriceps exercises	Control	Reported significance	Comment
Mitchell 2001	Nottingham Health Profile Pain component at 6 weeks	Median = 11.2 IQR = 0.0 to 42.6 n = 27	Median = 20.9 IQR = 5.8 to 34.1 n = 27	Not statistically significant	100 = worst score
Mitchell 2001	Nottingham Health Profile Pain component at 6 weeks	Median = 24.0 IQR = 0.0 to 60.8 n = 20	Median = 18.7 IQR = 5.8 to 34.1 n = 21	Not statistically significant	

Nottingham Health Profile (health status) (*Continued*)

Mitchell 2001	Nottingham Health Profile Pain component at 6 weeks	Median = 11.2 IQR = 0.0 to 42.6 n = 27	Median = 20.9 IQR = 5.8 to 34.1 n = 27	Not statistically significant	100 = worst score
Mitchell 2001	Nottingham Health Profile Pain component at 6 weeks	Median = 24.0 IQR = 0.0 to 60.8 n = 20	Median = 18.7 IQR = 5.8 to 34.1 n = 21	Not statistically significant	
Mitchell 2001	Nottingham Health Profile Energy component at 6 weeks	Median = 39.2 IQR = 0.0 to 63.2 n = 27	Median = 60.0 IQR = 24.0 to 100.0 n = 27	Not statistically significant	100 = worst score
Mitchell 2001	Nottingham Health Profile Energy component at 6 weeks	Median = 24.0 IQR = 0.0 to 60.8 n = 20	Median = 63.2 IQR = 39.2 to 100.0 n = 21	P = 0.0185	

Analysis 5.9. Comparison 5 Quadriceps training programme versus conventional physiotherapy alone, Outcome 9 Leg extensor power (watts).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 5 Quadriceps training programme versus conventional physiotherapy alone

Outcome: 9 Leg extensor power (watts)

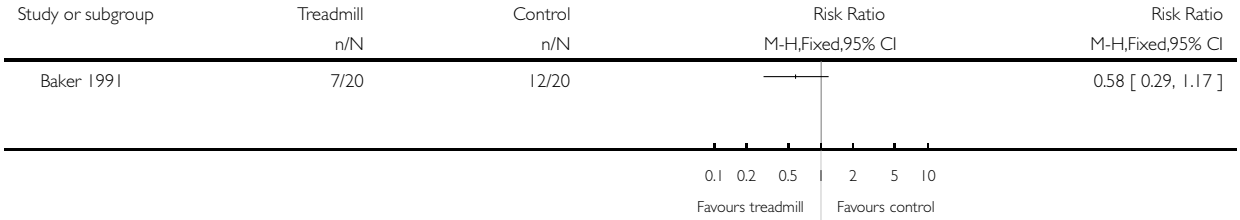
Study or subgroup	Quadriceps exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Fractured leg at 6 weeks						
Mitchell 2001	30	25.7 (11.5)	29	17.7 (8.6)		8.00 [2.83, 13.17]
2 Non-fractured leg at 6 weeks						
Mitchell 2001	30	34.9 (16.4)	29	24.8 (13.5)		10.10 [2.45, 17.75]
3 Fractured leg at 16 weeks						
Mitchell 2001	20	33 (17.4)	24	21.2 (11.3)		11.80 [2.93, 20.67]
4 Non-fractured leg at 16 weeks						
Mitchell 2001	20	40.1 (19.2)	24	25.4 (10.8)		14.70 [5.24, 24.16]

Analysis 6.1. Comparison 6 Treadmill gait training versus conventional gait training, Outcome 1 Failure to regain pre-fracture mobility.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 6 Treadmill gait training versus conventional gait training

Outcome: 1 Failure to regain pre-fracture mobility

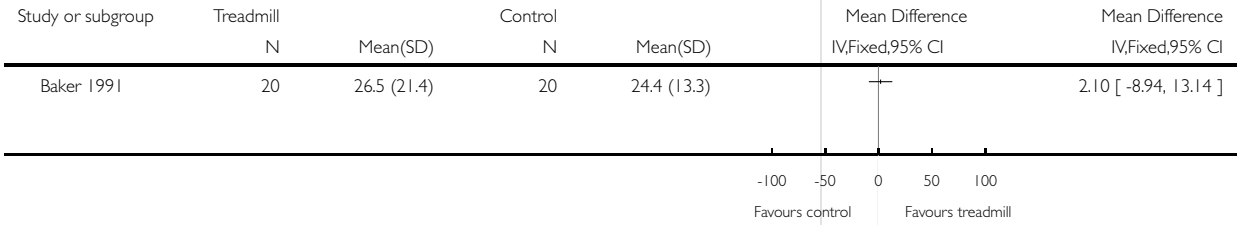


Analysis 6.2. Comparison 6 Treadmill gait training versus conventional gait training, Outcome 2 Gait velocity (metres/minute).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 6 Treadmill gait training versus conventional gait training

Outcome: 2 Gait velocity (metres/minute)



Analysis 7.1. Comparison 7 Electrical stimulation of quadriceps versus no or placebo stimulation, Outcome 1 Functional mobility (Elderly Mobility Scale).

Functional mobility (Elderly Mobility Scale)

Study	Measure	Electrical stimulation	Control	Reported significance	Comment
Braid 2008	Elderly Mobility Scale Change baseline to 6 weeks	Median = +7 IQR = 3.75 to 10 n = 13	Median = +7 IQR = 2 to 9 n = 10	Not statistically significant	Assessor blinding

Functional mobility (Elderly Mobility Scale) (*Continued*)

Braid 2008	Elderly Mobility Scale Change baseline to 14 weeks	Median = +8 IQR = 4.75 to 10.5 n = 9	Median = +4 IQR = 1.75 to 9.25 n = 9	Not statistically significant	Assessor blinding

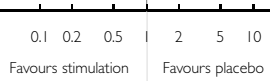
Analysis 7.2. Comparison 7 Electrical stimulation of quadriceps versus no or placebo stimulation, Outcome 2 Failure to regain pre-fracture mobility.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 7 Electrical stimulation of quadriceps versus no or placebo stimulation

Outcome: 2 Failure to regain pre-fracture mobility

Study or subgroup	Stimulation n/N	Placebo n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 At 7 weeks				
Lamb 2002	5/12	10/12		0.50 [0.24, 1.02]
2 At 13 weeks				
Lamb 2002	3/12	9/12		0.33 [0.12, 0.94]



Analysis 7.3. Comparison 7 Electrical stimulation of quadriceps versus no or placebo stimulation, Outcome 3 Gait velocity (walking speed over 15.25 metres) (metres/second).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 7 Electrical stimulation of quadriceps versus no or placebo stimulation

Outcome: 3 Gait velocity (walking speed over 15.25 metres) (metres/second)

Study or subgroup	Stimulation N	Mean(SD)	Placebo N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 At 7 weeks						
Lamb 2002	12	0.41 (0.29)	12	0.41 (0.2)		0.0 [-0.20, 0.20]
2 At 13 weeks						
Lamb 2002	12	0.54 (0.34)	12	0.43 (0.23)		0.11 [-0.12, 0.34]

Analysis 7.4. Comparison 7 Electrical stimulation of quadriceps versus no or placebo stimulation, Outcome 4 Unable to 'tandem stand' (postural instability).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 7 Electrical stimulation of quadriceps versus no or placebo stimulation

Outcome: 4 Unable to 'tandem stand' (postural instability)

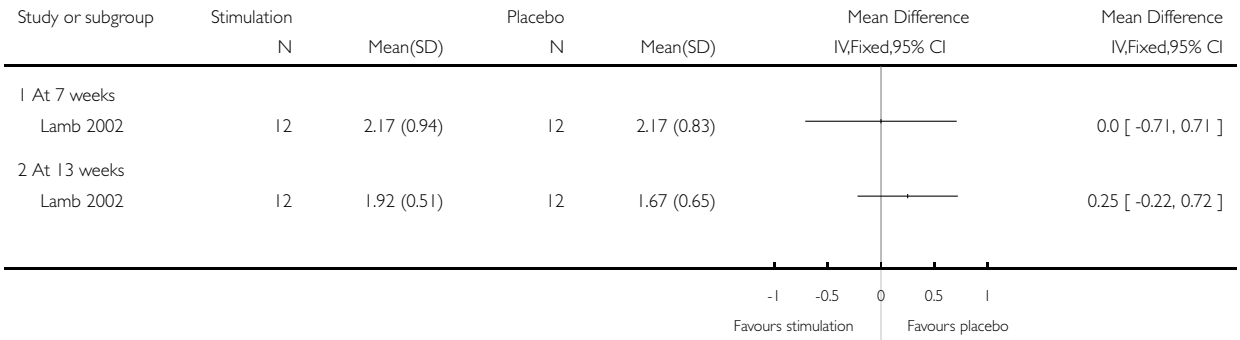
Study or subgroup	Stimulation n/N	Placebo n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 At 7 weeks				
Lamb 2002	4/12	9/12		0.44 [0.19, 1.05]
2 At 13 weeks				
Lamb 2002	4/12	5/12		0.80 [0.28, 2.27]

Analysis 7.5. Comparison 7 Electrical stimulation of quadriceps versus no or placebo stimulation, Outcome 5 Pain (6 point scale: 6 = constant severe pain).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 7 Electrical stimulation of quadriceps versus no or placebo stimulation

Outcome: 5 Pain (6 point scale: 6 = constant severe pain)

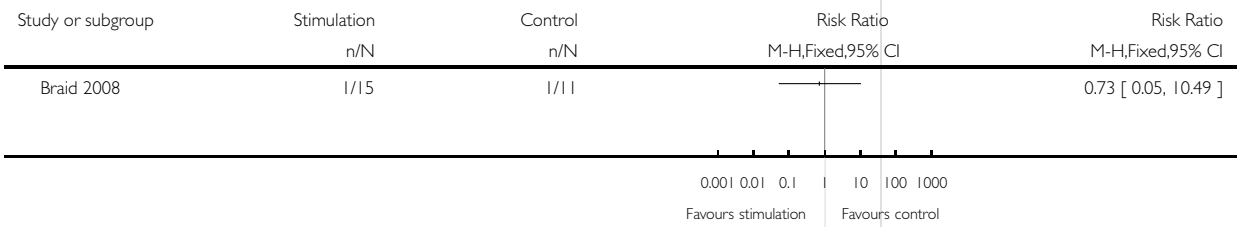


Analysis 7.6. Comparison 7 Electrical stimulation of quadriceps versus no or placebo stimulation, Outcome 6 Mortality.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 7 Electrical stimulation of quadriceps versus no or placebo stimulation

Outcome: 6 Mortality



Analysis 7.7. Comparison 7 Electrical stimulation of quadriceps versus no or placebo stimulation, Outcome 7 Barthel Index (disability): 20 point scale.

Barthel Index (disability): 20 point scale

Study	Measure	Electrical stimulation	Control	Reported significance	Comment
Braid 2008	Barthel Index Change baseline to 6 weeks	Median = 5 IQR = 4 to 7 n = 15	Median = 4 IQR = 2 to 7 n = 10	Not statistically significant	Assessor blinding

Barthel Index (disability): 20 point scale (*Continued*)

Braid 2008	Barthel Index Change baseline to 14 weeks	Median = 6 IQR = 3 to 7 n = 13	Median = 3 IQR = 2 to 5 n = 10	Not statistically significant	Assessor blinding

Analysis 7.8. Comparison 7 Electrical stimulation of quadriceps versus no or placebo stimulation, Outcome 8 Nottingham Health Profile (health status).

Nottingham Health Profile (health status)

Study	**Measure**	**Electrical stimulation**	**Control**	**Reported significance**	**Comment**
Braid 2008	Nottingham Health Profile Change baseline to 6 weeks	Median = -98 IQR = -144 to -44 n = 14	Median = -63 IQR = -99 to -6 n = 11	Not statistically significant	Assessor blinding
Braid 2008	Nottingham Health Profile Change baseline to 14 weeks	Median = -100 IQR = -149 to -24 n = 13	Median = -77 IQR = -150 to -5 n = 10	Not statistically significant	Assessor blinding

Analysis 7.9. Comparison 7 Electrical stimulation of quadriceps versus no or placebo stimulation, Outcome 9 Leg extensor power: change from baseline (watts).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 7 Electrical stimulation of quadriceps versus no or placebo stimulation

Outcome: 9 Leg extensor power: change from baseline (watts)

Study or subgroup	Stimulation N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Fractured leg at 6 weeks						
Braid 2008	13	10.9 (7.57)	10	15.3 (17.39)		-4.40 [-15.94, 7.14]
2 Non-fractured leg at 6 weeks						
Braid 2008	13	7.6 (14.72)	10	8.6 (9.8)		-1.00 [-11.05, 9.05]
3 Fractured leg at 14 weeks						
Braid 2008	9	14.7 (4.8)	9	26.1 (23.1)		-11.40 [-26.81, 4.01]
4 Non-fractured leg at 14 weeks						
Braid 2008	9	10.2 (15)	9	13.6 (14.7)		-3.40 [-17.12, 10.32]

Analysis 7.10. Comparison 7 Electrical stimulation of quadriceps versus no or placebo stimulation, Outcome 10 Leg extensor power (watts/kilogram).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 7 Electrical stimulation of quadriceps versus no or placebo stimulation

Outcome: 10 Leg extensor power (watts/kilogram)

Study or subgroup	Stimulation N	Mean(SD)	Placebo N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Fractured leg at 7 weeks						
Lamb 2002	12	0.75 (0.39)	12	0.58 (0.28)		0.17 [-0.10, 0.44]
2 Non-fractured leg at 7 weeks						
Lamb 2002	12	0.95 (0.47)	12	0.96 (0.34)		-0.01 [-0.34, 0.32]
3 Fractured leg at 13 weeks						
Lamb 2002	12	0.83 (0.42)	12	0.63 (0.32)		0.20 [-0.10, 0.50]
4 Non-fractured leg at 13 weeks						
Lamb 2002	12	1.06 (0.52)	12	1.02 (0.42)		0.04 [-0.34, 0.42]

Analysis 8.1. Comparison 8 Electrical stimulation (pain alleviation) versus placebo stimulation, Outcome 1 Effect of pain on walking ability (1: no interference; 10: complete interference).

Effect of pain on walking ability (1: no interference; 10: complete interference)

Study	Measure	Electrical stimulation	Control	Reported significance	Comment
Gorodetskyi 2007	Walking ability, impact of pain on day 10. (Pain inventory.)	Mean = 1.6 Range = 0 to 3 n = 30	Mean = 5.5 Range = 4 to 9 n = 30	On 10^{th} day, ES group had minimal interference on walking due to pain compared with the sham ES group	A direct measure of mobility was not reported.

Analysis 8.2. Comparison 8 Electrical stimulation (pain alleviation) versus placebo stimulation, Outcome 2 Overall assessment of outcome by an orthopaedic surgeon.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 8 Electrical stimulation (pain alleviation) versus placebo stimulation

Outcome: 2 Overall assessment of outcome by an orthopaedic surgeon

Study or subgroup	Stimulation n/N	Placebo n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Average or better recovery at 10 days				
Gorodetskyi 2007	30/30	15/30		1.97 [1.38, 2.81]
2 Full or substantial recovery at 10 days				
Gorodetskyi 2007	30/30	0/30		61.00 [3.90, 953.95]

Analysis 8.3. Comparison 8 Electrical stimulation (pain alleviation) versus placebo stimulation, Outcome 3 Range of motion: hip flexion (degrees).

Range of motion: hip flexion (degrees)

Study	Measure	Electrical stimulation	Control	Reported significance	Comment

Range of motion: hip flexion (degrees) (*Continued*)

Gorodetskyi 2007	Hip flexion (degrees) on day 9.	Mean = 88.7 Range = 80 to 90 n = 30	Mean = 63 Range = 45 to 85 n = 30	Results "highly significant (ANOVA, P < 0.001) for the treatment group and for the effects of treatment over time".	Evident from the graph but it is not clear why day 9 rather than day 10 results were selected

Analysis 9.1. Comparison 9 Resistance training for 12 weeks versus attention control, Outcome 1 SF-12 physical component.

SF-12 physical component

Study	**Measure**	**Resistance training**	**Attention control**	**Reported significance**	**Comment**
Miller 2006	SF-12 physical component (0 to 100: best) at 12 weeks	Median = 31.5 95% CI = 28.2 to 41.9 n = 23	Median = 30.1 95% CI = 26.3 to 36.3 n = 25	Not significant	Actual denominators not confirmed.

Analysis 9.2. Comparison 9 Resistance training for 12 weeks versus attention control, Outcome 2 Gait speed at 12 weeks.

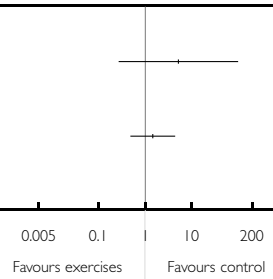
Gait speed at 12 weeks

Study	**Measure**	**Resistance training**	**Attention control**	**Reported significance**	**Comment**
Miller 2006	Gait speed at 12 weeks (m/s)	Median = 0.4 95% CI = 0.3 to 0.6 n = 23	Median = 0.5 95% CI = 0.3 to 0.6 n = 25	Not significant	Actual denominators not confirmed.

Analysis 9.3. Comparison 9 Resistance training for 12 weeks versus attention control, Outcome 3 Mortality.

Review: Interventions for improving mobility after hip fracture surgery in adults
Comparison: 9 Resistance training for 12 weeks versus attention control
Outcome: 3 Mortality

Study or subgroup	Resistance exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 At 12 weeks				
Miller 2006	2/25	0/26		5.19 [0.26, 103.07]
2 At 12 months (hip fracture)				
Miller 2006	6/21	4/20		1.43 [0.47, 4.32]



Analysis 9.4. Comparison 9 Resistance training for 12 weeks versus attention control, Outcome 4 Hospital readmission.

Review: Interventions for improving mobility after hip fracture surgery in adults
Comparison: 9 Resistance training for 12 weeks versus attention control
Outcome: 4 Hospital readmission

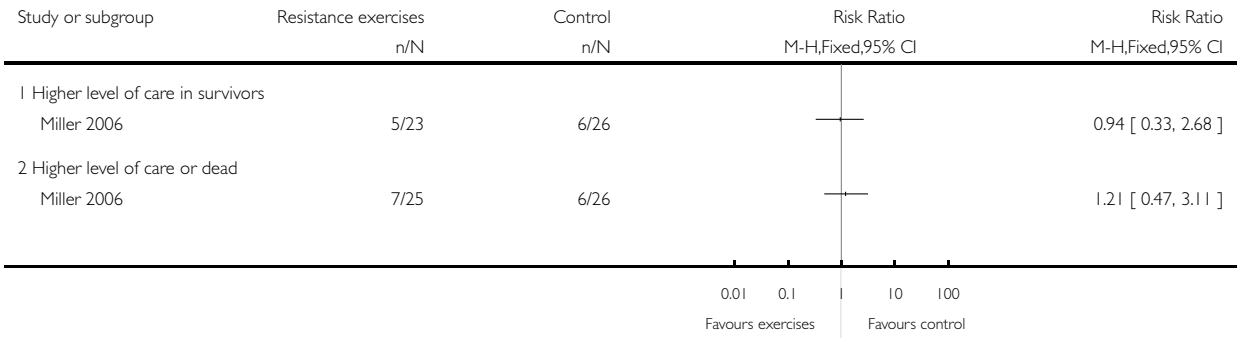
Study or subgroup	Resistance exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 At 12 weeks				
Miller 2006	3/25	4/26		0.78 [0.19, 3.14]
2 At 12 months				
Miller 2006	8/25	6/26		1.39 [0.56, 3.43]

Analysis 9.5. Comparison 9 Resistance training for 12 weeks versus attention control, Outcome 5 Admitted to higher level of care (12 weeks).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 9 Resistance training for 12 weeks versus attention control

Outcome: 5 Admitted to higher level of care (12 weeks)



Analysis 9.6. Comparison 9 Resistance training for 12 weeks versus attention control, Outcome 6 SF-12 mental component.

SF-12 mental component

Study	Measure	Resistance training	Attention control	Reported significance	Comment
Miller 2006	SF-12 mental component (0 to 100: best) at 12 weeks	Median = 51.3 95% CI = 46.5 to 57.8 n = 23	Median = 49.5 95% CI = 41.1 to 58.8 n = 25	Not significant	Actual denominators not confirmed.

Analysis 9.7. Comparison 9 Resistance training for 12 weeks versus attention control, Outcome 7 Quadriceps strength (kg).

Quadriceps strength (kg)

Study	Measure	Resistance training	Attention control	Reported significance	Comment
Miller 2006	Quadriceps strength (injured leg)	Median = 5.2 95% CI = 3.8 to 6.2 n = 23	Median = 5.1 95% CI = 3.4 to 7.6 n = 25	Not significant	Actual denominators not confirmed.
Miller 2006	Quadriceps strength (non-injured leg)	Median = 5.2 95% CI = 3.7 to 7.0 n = 23	Median = 4.8 95% CI = 4.3 to 7.2 n = 25	Not significant	Actual denominators not confirmed.

Analysis 9.8. Comparison 9 Resistance training for 12 weeks versus attention control, Outcome 8 Length of stay (in days).

Length of stay (in days)

Study	Measure	Resistance training	Attention control	Reported significance	Comment
Miller 2006	Acute hospital stay	Median = 11.0 95% CI = 8.0 to 17.0 n = 25	Median = 12.0 95% CI = 6.0 to 22.0 n = 26	Not significant	
Miller 2006	Total (including rehabilitation)	Median = 23.0 95% CI = 16.0 to 32.0 n = 25	Median = 24.0 95% CI = 17.0 to 30.0 n = 26	Not significant	Rehabilitation facility or in the home included for 10 and 12 participants in the respective groups

Analysis 10.1. Comparison 10 Resistance training for 12 weeks + nutrition intervention versus attention control, Outcome 1 SF-12 physical component.

SF-12 physical component

Study	Measure	Resistance training + nutrition	Attention control	Reported significance	Comment
Miller 2006	SF-12 physical component (0 to 100: best) at 12 weeks	Median = 26.9 95% CI = 22.6 to 38.5 n = 22	Median = 30.1 95% CI = 26.3 to 36.3 n = 25	Not significant	Actual denominators not confirmed.

Analysis 10.2. Comparison 10 Resistance training for 12 weeks + nutrition intervention versus attention control, Outcome 2 Gait speed at 12 weeks.

Gait speed at 12 weeks

Study	Measure	Resistance training + nutrition	Attention control	Reported significance	Comment
Miller 2006	Gait speed at 12 weeks (m/s)	Median = 0.3 95% CI = 0.2 to 0.7 n = 22	Median = 0.5 95% CI = 0.3 to 0.6 n = 25	Not significant	Actual denominators not confirmed.

Analysis 10.3. Comparison 10 Resistance training for 12 weeks + nutrition intervention versus attention control, Outcome 3 Mortality.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 10 Resistance training for 12 weeks + nutrition intervention versus attention control

Outcome: 3 Mortality

Study or subgroup	Exercises + nutrition n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 At 12 weeks				
Miller 2006	1/24	0/26		3.24 [0.14, 75.91]
2 At 12 months (hip fracture)				
Miller 2006	4/22	4/20		0.91 [0.26, 3.16]

Analysis 10.4. Comparison 10 Resistance training for 12 weeks + nutrition intervention versus attention control, Outcome 4 Hospital readmission.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 10 Resistance training for 12 weeks + nutrition intervention versus attention control

Outcome: 4 Hospital readmission

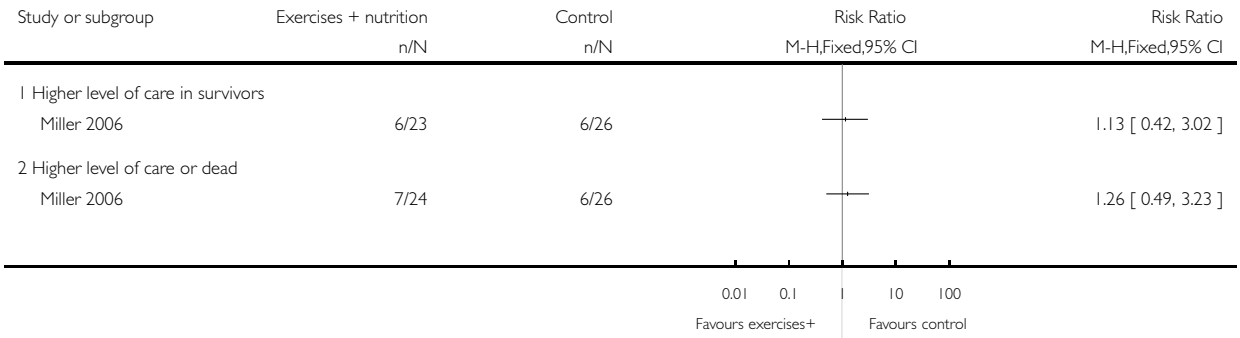
Study or subgroup	Exercises + nutrition n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 At 12 weeks				
Miller 2006	2/24	4/26		0.54 [0.11, 2.69]
2 At 12 months				
Miller 2006	6/24	6/26		1.08 [0.40, 2.90]

Analysis 10.5. Comparison 10 Resistance training for 12 weeks + nutrition intervention versus attention control, Outcome 5 Admitted to higher level of care (12 weeks).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 10 Resistance training for 12 weeks + nutrition intervention versus attention control

Outcome: 5 Admitted to higher level of care (12 weeks)



Analysis 10.6. Comparison 10 Resistance training for 12 weeks + nutrition intervention versus attention control, Outcome 6 SF-12 mental component.

SF-12 mental component

Study	Measure	Resistance training + nutrition	Attention control	Reported significance	Comment
Miller 2006	SF-12 mental component (0 to 100: best) at 12 weeks	Median = 49.8 95% CI = 46.8 to 58.3 n = 23	Median = 49.5 95% CI = 41.1 to 58.8 n = 25	Not significant	Actual denominators not confirmed.

Analysis 10.7. Comparison 10 Resistance training for 12 weeks + nutrition intervention versus attention control, Outcome 7 Quadriceps strength (kg).

Quadriceps strength (kg)

Study	Measure	Resistance training + nutrition	Attention control	Reported significance	Comment
Miller 2006	Quadriceps strength (injured leg)	Median = 5.7 95% CI = 4.6 to 7.6 n = 22	Median = 5.1 95% CI = 3.4 to 7.6 n = 25	Not significant	Actual denominators not confirmed.
Miller 2006	Quadriceps strength (non-injured leg)	Median = 6.8 95% CI = 5.8 to 8.8 n = 22	Median = 4.8 95% CI = 4.3 to 7.2 n = 25	Not significant	Actual denominators not confirmed.

Analysis 10.8. Comparison 10 Resistance training for 12 weeks + nutrition intervention versus attention control, Outcome 8 Length of stay (in days).

Length of stay (in days)

Study	**Measure**	**Resistance training + nutrition**	**Attention control**	**Reported significance**	**Comment**
Miller 2006	Acute hospital stay	Median = 10.0 95% CI = 7.0 to 12.0 n = 22	Median = 12.0 95% CI = 6.0 to 22.0 n = 26	Not significant	
Miller 2006	Total (including rehabilitation)	Median = 27.5 95% CI = 13.0 to 31.0 n = 25	Median = 24.0 95% CI = 17.0 to 30.0 n = 26	Not significant	Rehabilitation facility or in the home included for 14 and 12 participants in the respective groups

Analysis 11.1. Comparison 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks, Outcome 1 Mobility at 16 weeks.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks

Outcome: 1 Mobility at 16 weeks

Study or subgroup	Weight-bear: high dose n/N	Non weight-bear: low dose n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Unable to walk unaided or with sticks or crutches				
Moseley 2009	29/73	31/77		0.99 [0.67, 1.46]
2 Poor or fair self-rated mobility				
Moseley 2009	32/73	42/76		0.79 [0.57, 1.10]

Analysis 11.2. Comparison 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks, Outcome 2 Physical Performance and Mobility Examination score (0: failure to 12: top score) at 16 weeks.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks

Outcome: 2 Physical Performance and Mobility Examination score (0: failure to 12: top score) at 16 weeks

Study or subgroup	Weight-bear: high dose		Non weight-bear: low dose		Mean Difference	Mean Difference
	N	Mean(SD)	N	Mean(SD)	IV,Fixed,95% CI	IV,Fixed,95% CI
Moseley 2009	73	9.3 (2.4)	77	9.1 (2.4)		0.20 [-0.57, 0.97]

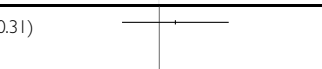
Analysis 11.3. Comparison 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks, Outcome 3 Walking speed (m/sec) at 16 weeks.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks

Outcome: 3 Walking speed (m/sec) at 16 weeks

Study or subgroup	Weight-bear: high dose		Non weight-bear: low dose		Mean Difference	Mean Difference
	N	Mean(SD)	N	Mean(SD)	IV,Fixed,95% CI	IV,Fixed,95% CI
Moseley 2009	73	0.63 (0.32)	77	0.6 (0.31)		0.03 [-0.07, 0.13]



Analysis 11.4. Comparison 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks, Outcome 4 Functional performance tests: stand to sit (stand-ups/sec).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks

Outcome: 4 Functional performance tests: stand to sit (stand-ups/sec)

Study or subgroup	Weight-bear: high dose N	Mean(SD)	Non weight-bear: low dose N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Moseley 2009	73	0.26 (0.14)	77	0.22 (0.11)		0.04 [0.00, 0.08]

Analysis 11.5. Comparison 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks, Outcome 5 Balance at 16 weeks.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks

Outcome: 5 Balance at 16 weeks

Study or subgroup	Weight-bear: high dose N	Mean(SD)	Non weight-bear: low dose N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Step test fractured leg (steps)						
Moseley 2009	73	7.1 (5.2)	77	5.7 (5)		1.40 [-0.23, 3.03]
2 Maximum balance range (mm)						
Moseley 2009	73	101 (48)	77	108 (43)		-7.00 [-21.61, 7.61]

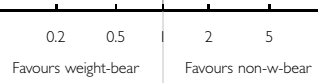
Analysis 11.6. Comparison 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks, Outcome 6 Subjective rating of pain, balance, strength at 16 weeks.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks

Outcome: 6 Subjective rating of pain, balance, strength at 16 weeks

Study or subgroup	Weight-bear: high dose n/N	Non weight-bear: low dose n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Some, moderate or severe pain				
Moseley 2009	30/73	29/77		1.09 [0.73, 1.62]
2 Poor or fair balance only				
Moseley 2009	44/73	41/76		1.12 [0.85, 1.48]
3 Poor or fair strength only				
Moseley 2009	37/73	47/76		0.82 [0.62, 1.09]



Analysis 11.7. Comparison 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks, Outcome 7 Mortality and hospital readmission at 16 weeks.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks

Outcome: 7 Mortality and hospital readmission at 16 weeks

Study or subgroup	Weight-bear: high dose n/N	Non weight-bear: low dose n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Mortality				
Moseley 2009	5/80	2/80		2.50 [0.50, 12.51]
2 Readmission during study				
Moseley 2009	9/73	12/77		0.79 [0.35, 1.77]

Analysis 11.8. Comparison 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks, Outcome 8 Fell at least once during study (16 weeks).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks

Outcome: 8 Fell at least once during study (16 weeks)

Study or subgroup	Weight-bear: high dose n/N	Non weight-bear: low dose n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
Moseley 2009	19/73	22/77		0.91 [0.54, 1.54]

Analysis 11.9. Comparison 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks, Outcome 9 Barthel index at 16 weeks.

Barthel index at 16 weeks

Study	Measure	Weight-bear exercises: high dose	Non-weight-bear: low dose
Moseley 2009	Barthel index (0 to 100: independence in activity in daily living)	Median = 95 Interquartile range = 90 to 100 n = 73	Median = 95 Interquartile range = 85 to 100 n = 77

Analysis 11.10. Comparison 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks, Outcome 10 Residence and user of community services at 16 weeks.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks

Outcome: 10 Residence and user of community services at 16 weeks

Study or subgroup	Weight-bear: high dose n/N	Non weight-bear: low dose n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 In hostel, nursing home or hospital				
Moseley 2009	28/73	24/77		1.23 [0.79, 1.91]
2 User of community services				
Moseley 2009	25/45	14/53		2.10 [1.25, 3.54]

Analysis 11.11. Comparison 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks, Outcome 11 EQ-5D (0 to 1: best quality of life) at 16 weeks.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks

Outcome: 11 EQ-5D (0 to 1: best quality of life) at 16 weeks

Study or subgroup	Weight-bear: high dose N	Mean(SD)	Non weight-bear: low dose N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Moseley 2009	73	0.62 (0.3)	77	0.62 (0.26)		0.0 [-0.09, 0.09]

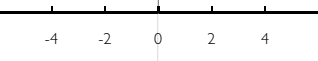
Analysis 11.12. Comparison 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks, Outcome 12 Knee extensor strength, fractured leg (kg) at 16 weeks.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks

Outcome: 12 Knee extensor strength, fractured leg (kg) at 16 weeks

Study or subgroup	Weight-bear: high dose N	Mean(SD)	Non weight-bear: low dose N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Moseley 2009	73	10.3 (5)	77	9.3 (4.4)		1.00 [-0.51, 2.51]



Analysis 11.13. Comparison 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks, Outcome 13 Participant reported negative effects (e.g. joint or muscle pain, general pain, tiredness etc).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks

Outcome: 13 Participant reported negative effects (e.g. joint or muscle pain, general pain, tiredness etc)

Study or subgroup	Weight-bear: high dose n/N	Non weight-bear: low dose n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 At 4 weeks				
Moseley 2009	27/77	29/78		0.94 [0.62, 1.43]
2 At 16 weeks				
Moseley 2009	21/71	16/76		1.40 [0.80, 2.47]

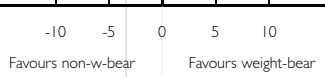
Analysis 11.14. Comparison 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks, Outcome 14 Length of inpatient rehabilitation (days).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 11 High dose weight bearing versus low dose mainly non-weight-bearing exercises for 16 weeks

Outcome: 14 Length of inpatient rehabilitation (days)

Study or subgroup	Weight-bear: high dose N	Mean(SD)	Non weight-bear: low dose N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Moseley 2009	73	28 (15)	77	25 (14)		3.00 [-1.65, 7.65]



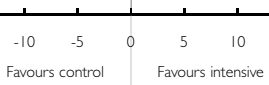
Analysis 12.1. Comparison 12 Intensive physical training versus placebo activities (started post-discharge), Outcome 1 Tinetti's POMA (Performance Orientated Mobility Assessment).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 12 Intensive physical training versus placebo activities (started post-discharge)

Outcome: 1 Tinetti's POMA (Performance Orientated Mobility Assessment)

Study or subgroup	Intensive N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Overall POMA (0 to 30. higher = better)						
Hauer 2002	12	23.5 (4.5)	12	20.5 (4)		3.00 [-0.41, 6.41]
2 POMA part 1 (balance: 0 to 15)						
Hauer 2002	12	12.7 (2.2)	12	11.4 (2.4)		1.30 [-0.54, 3.14]
3 POMA part 2 (gait: 0 to 15)						
Hauer 2002	12	10.8 (2.5)	12	9.1 (2.1)		1.70 [-0.15, 3.55]



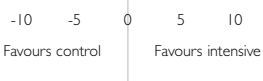
Analysis 12.2. Comparison 12 Intensive physical training versus placebo activities (started post-discharge), Outcome 2 Gait parameters.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 12 Intensive physical training versus placebo activities (started post-discharge)

Outcome: 2 Gait parameters

Study or subgroup	Intensive N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Walking velocity (metres/second)						
Hauer 2002	12	0.72 (0.28)	12	0.49 (0.15)		0.23 [0.05, 0.41]
2 Box step fractured leg (cm)						
Hauer 2002	12	34.5 (6.4)	12	30.6 (9.8)		3.90 [-2.72, 10.52]
3 Box step non-fractured leg (cm)						
Hauer 2002	12	38.5 (7.8)	12	34.4 (5.8)		4.10 [-1.40, 9.60]



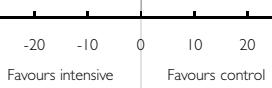
Analysis 12.3. Comparison 12 Intensive physical training versus placebo activities (started post-discharge), Outcome 3 Functional performance tests.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 12 Intensive physical training versus placebo activities (started post-discharge)

Outcome: 3 Functional performance tests

Study or subgroup	Intensive N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Timed up-and-go (seconds)						
Hauer 2002	12	26.1 (17.8)	12	26.9 (9.8)		-0.80 [-12.30, 10.70]
2 Chair rise (seconds)						
Hauer 2002	12	16.9 (5.7)	12	18.7 (6.3)		-1.80 [-6.61, 3.01]
3 Stair rise (seconds)						
Hauer 2002	12	16.9 (6.2)	12	24.7 (11.4)		-7.80 [-15.14, -0.46]



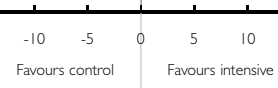
Analysis 12.4. Comparison 12 Intensive physical training versus placebo activities (started post-discharge), Outcome 4 Balance.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 12 Intensive physical training versus placebo activities (started post-discharge)

Outcome: 4 Balance

Study or subgroup	Intensive N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Balance score (0 to 20 (20 successful tests))						
Hauer 2002	12	13.4 (1.2)	12	12.2 (2.7)		1.20 [-0.47, 2.87]
2 Functional reach (cm)						
Hauer 2002	12	18.2 (6.5)	12	17.1 (8.7)		1.10 [-5.04, 7.24]



Analysis 12.5. Comparison 12 Intensive physical training versus placebo activities (started post-discharge), Outcome 5 Subjective/emotional state assessment, falls, balance and general.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 12 Intensive physical training versus placebo activities (started post-discharge)

Outcome: 5 Subjective/emotional state assessment, falls, balance and general

Study or subgroup	Intensive N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Fall Handicap Inventory (0 to 72: highest disability)						
Hauer 2002	12	12 (13.5)	12	28 (14.7)		-16.00 [-27.29, -4.71]
2 Fear of falling						
Hauer 2002	12	1 (0.92)	12	1.78 (0.67)		-0.78 [-1.42, -0.14]
3 Walking unsteadiness						
Hauer 2002	12	1.5 (0.53)	12	2 (0.5)		-0.50 [-0.91, -0.09]
4 Geriatric Depression Scale (0 to 30: very depressed)						
Hauer 2002	12	3 (2.4)	12	3.8 (2.8)		-0.80 [-2.89, 1.29]

Analysis 12.6. Comparison 12 Intensive physical training versus placebo activities (started post-discharge), Outcome 6 Loss of social independence.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 12 Intensive physical training versus placebo activities (started post-discharge)

Outcome: 6 Loss of social independence

Study or subgroup	Intensive n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
Hauer 2002	3/15	4/13		0.65 [0.18, 2.38]

Analysis 12.7. Comparison 12 Intensive physical training versus placebo activities (started post-discharge), Outcome 7 Functional performance measures.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 12 Intensive physical training versus placebo activities (started post-discharge)

Outcome: 7 Functional performance measures

Study or subgroup	Intensive N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Barthel's ADL (activities of daily living) (0 to 100: fully independent)						
Hauer 2002	12	93 (8.2)	12	96.1 (8.2)		-3.10 [-9.66, 3.46]
2 Lawton's IADL (instrumental activities of daily living) (0 to 8: fully competent)						
Hauer 2002	12	7.3 (1.4)	12	6.9 (1.3)		0.40 [-0.68, 1.48]
3 Total activity						
Hauer 2002	12	11 (6.5)	12	6.5 (3.2)		4.50 [0.40, 8.60]
4 'Sports' activities						
Hauer 2002	12	7.8 (4.5)	12	4.9 (3)		2.90 [-0.16, 5.96]
5 Household activities						
Hauer 2002	12	1.7 (0.8)	12	1.6 (0.6)		0.10 [-0.47, 0.67]

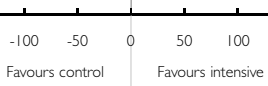
Analysis 12.8. Comparison 12 Intensive physical training versus placebo activities (started post-discharge), Outcome 8 Strength measures.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 12 Intensive physical training versus placebo activities (started post-discharge)

Outcome: 8 Strength measures

Study or subgroup	Intensive N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Leg-press fractured side (kg)						
Hauer 2002	12	71 (35)	12	50 (21)		21.00 [-2.09, 44.09]
2 Leg-press non-fractured side (kg)						
Hauer 2002	12	88 (39)	12	67 (17)		21.00 [-3.07, 45.07]
3 Leg extensor fractured side (Newtons)						
Hauer 2002	12	68 (13)	12	51 (22)		17.00 [2.54, 31.46]
4 Leg extensor fractured side (Newtons)						
Hauer 2002	12	80 (11)	12	60 (20)		20.00 [7.09, 32.91]
5 Leg flexor fractured side (Newtons)						
Hauer 2002	12	37 (7)	12	34 (13)		3.00 [-5.35, 11.35]
6 Leg flexor non-fractured side (Newtons)						
Hauer 2002	12	39 (11)	12	37 (12)		2.00 [-7.21, 11.21]
7 Ankle plantar flexion fractured side (Newtons)						
Hauer 2002	12	88 (30)	12	65 (33)		23.00 [-2.23, 48.23]
8 Ankle plantar flexion non-fractured side (Newtons)						
Hauer 2002	12	98 (32)	12	78 (32)		20.00 [-5.60, 45.60]
9 Hand grip both hands (KPa)						
Hauer 2002	12	121 (29)	12	108 (28)		13.00 [-9.81, 35.81]



Analysis 12.9. Comparison 12 Intensive physical training versus placebo activities (started post-discharge), Outcome 9 Adherence.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 12 Intensive physical training versus placebo activities (started post-discharge)

Outcome: 9 Adherence

Study or subgroup	Intensive N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Hauer 2002	13	93.1 (13.5)	12	96.7 (6.1)		-3.60 [-11.71, 4.51]

Analysis 13.1. Comparison 13 Home-based physical therapy versus unsupervised home exercise programme, Outcome 1 Functional status.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 13 Home-based physical therapy versus unsupervised home exercise programme

Outcome: 1 Functional status

Study or subgroup	Home therapy N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Harris hip score at 3 months (range 0: worst to 100: best function)						
Tsauo 2005	13	90.16 (5.4)	12	77.4 (10)		12.76 [6.39, 19.13]
2 Harris hip score at 6 months (range 0: worst to 100: best function)						
Tsauo 2005	13	95.6 (5.7)	12	90.8 (6.1)		4.80 [0.16, 9.44]

Analysis 13.2. Comparison 13 Home-based physical therapy versus unsupervised home exercise programme, Outcome 2 Quality of life.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 13 Home-based physical therapy versus unsupervised home exercise programme

Outcome: 2 Quality of life

Study or subgroup	Home therapy N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 WHOQOL-BREF physical health score at 3 months (highest score = 20)						
Tsauo 2005	13	15.4 (1.6)	12	13.2 (2.7)		2.20 [0.44, 3.96]
2 WHOQOL-BREF psychological at 3 months (highest score = 20)						
Tsauo 2005	13	15.6 (2.2)	12	12.3 (2.4)		3.30 [1.49, 5.11]
3 WHOQOL-BREF physical health score at 6 months (highest score = 20)						
Tsauo 2005	13	17.1 (1.6)	12	15.8 (2.2)		1.30 [-0.22, 2.82]
4 WHOQOL-BREF psychological at 6 months (highest score = 20)						
Tsauo 2005	13	15.7 (2.1)	12	13.9 (2.1)		1.80 [0.15, 3.45]

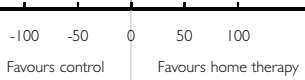
Analysis 13.3. Comparison 13 Home-based physical therapy versus unsupervised home exercise programme, Outcome 3 Gait: walking speed (metres/minute).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 13 Home-based physical therapy versus unsupervised home exercise programme

Outcome: 3 Gait: walking speed (metres/minute)

Study or subgroup	Home therapy N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Tsauo 2005	13	22.7 (14.4)	12	22.1 (14.4)		0.60 [-10.70, 11.90]



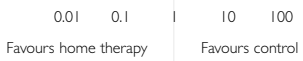
Analysis 13.4. Comparison 13 Home-based physical therapy versus unsupervised home exercise programme, Outcome 4 Complications.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 13 Home-based physical therapy versus unsupervised home exercise programme

Outcome: 4 Complications

Study or subgroup	Home therapy n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Wound infection				
Tsauo 2005	1/13	1/12		0.92 [0.06, 13.18]
2 Refracture				
Tsauo 2005	2/13	0/12		4.64 [0.25, 87.91]
3 GI tract bleed				
Tsauo 2005	1/13	0/12		2.79 [0.12, 62.48]



Analysis 13.5. Comparison 13 Home-based physical therapy versus unsupervised home exercise programme, Outcome 5 Strength at six months.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 13 Home-based physical therapy versus unsupervised home exercise programme

Outcome: 5 Strength at six months

Study or subgroup	Home therapy N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Hip flexor strength (Newtons)						
Tsauo 2005	13	70.5 (12.4)	12	66.3 (9.9)		4.20 [-4.56, 12.96]
2 Hip extensor strength (Newtons)						
Tsauo 2005	13	67.4 (18.1)	12	66.5 (12.5)		0.90 [-11.22, 13.02]
3 Hip abductor strength (Newtons)						
Tsauo 2005	13	70.3 (13.5)	12	68.2 (13.4)		2.10 [-8.45, 12.65]
4 Knee extensor strength (Newtons)						
Tsauo 2005	13	82.4 (18.6)	12	74.6 (20.6)		7.80 [-7.63, 23.23]

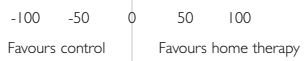
Analysis 13.6. Comparison 13 Home-based physical therapy versus unsupervised home exercise programme, Outcome 6 Range of motion: Hip flexion range (degrees).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 13 Home-based physical therapy versus unsupervised home exercise programme

Outcome: 6 Range of motion: Hip flexion range (degrees)

Study or subgroup	Home therapy N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Tsauo 2005	13	90.8 (25.6)	12	100 (10.7)		-9.20 [-24.38, 5.98]



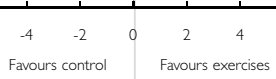
Analysis 14.1. Comparison 14 Home-based supervised exercise programme (+/- motivational interventions) versus usual care, Outcome 1 Activity levels: hours of exercise per weeks at 12 months from injury.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 14 Home-based supervised exercise programme (+/- motivational interventions) versus usual care

Outcome: 1 Activity levels: hours of exercise per weeks at 12 months from injury

Study or subgroup	Exercises (+) N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Exercises only						
Resnick 2007	35	3.34 (3.9)	40	0.92 (1.45)		2.42 [1.05, 3.79]
2 Exercises + motivation						
Resnick 2007	36	3.1 (3.9)	40	0.92 (1.45)		2.18 [0.83, 3.53]



Analysis 14.2. Comparison 14 Home-based supervised exercise programme (+/- motivational interventions) versus usual care, Outcome 2 Activity levels: number of steps over 48 hours (12 months from injury).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 14 Home-based supervised exercise programme (+/- motivational interventions) versus usual care

Outcome: 2 Activity levels: number of steps over 48 hours (12 months from injury)

Study or subgroup	Exercises (+) N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Exercises only						
Resnick 2007	35	6459 (5726.8)	40	4060 (3940)		2399.00 [142.81, 4655.19]

Analysis 14.3. Comparison 14 Home-based supervised exercise programme (+/- motivational interventions) versus usual care, Outcome 3 Mortality.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 14 Home-based supervised exercise programme (+/- motivational interventions) versus usual care

Outcome: 3 Mortality

Study or subgroup	Exercises (+) n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Exercises only				
Resnick 2007	2/51	3/51		0.67 [0.12, 3.82]
2 Exercises + motivation				
Resnick 2007	2/52	3/51		0.65 [0.11, 3.75]

Analysis 14.4. Comparison 14 Home-based supervised exercise programme (+/- motivational interventions) versus usual care, Outcome 4 Refusal to participate in study or measurement (12 months from injury).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 14 Home-based supervised exercise programme (+/- motivational interventions) versus usual care

Outcome: 4 Refusal to participate in study or measurement (12 months from injury)

Study or subgroup	Exercises (+) n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Exercises only				
Resnick 2007	10/51	5/51		2.00 [0.74, 5.44]
2 Exercises + motivation				
Resnick 2007	10/52	5/51		1.96 [0.72, 5.34]

Analysis 15.1. Comparison 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise, Outcome 1 Modified Physical Performance Test score at 6 months (0: worst to 36: best).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise

Outcome: 1 Modified Physical Performance Test score at 6 months (0: worst to 36: best)

Study or subgroup	Intensive exercise N	Mean(SD)	Home exercise N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Binder 2004	37	29 (6.1)	43	23.3 (7.4)		5.70 [2.74, 8.66]

Analysis 15.2. Comparison 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise, Outcome 2 Assistive device continued to be required.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise

Outcome: 2 Assistive device continued to be required

Study or subgroup	Intensive exercise n/N	Home exercise n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
Binder 2004	14/33	24/35		0.62 [0.39, 0.98]

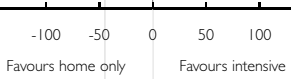
Analysis 15.3. Comparison 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise, Outcome 3 Gait: fast walking speed (metres/minute).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise

Outcome: 3 Gait: fast walking speed (metres/minute)

Study or subgroup	Intensive exercise N	Mean(SD)	Home exercise N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Binder 2004	36	72.9 (24.5)	43	59.4 (23)		13.50 [2.95, 24.05]



Analysis 15.4. Comparison 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise, Outcome 4 Balance at 6 months.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise

Outcome: 4 Balance at 6 months

Study or subgroup	Intensive exercise N	Mean(SD)	Home exercise N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Single limb stance time fractured side (seconds)						
Binder 2004	38	6.8 (8.8)	34	2.8 (3.1)		4.00 [1.01, 6.99]
2 Berg Balance Score (0 to 56: best)						
Binder 2004	39	49 (8)	42	43 (10)		6.00 [2.07, 9.93]

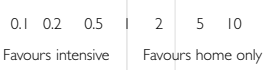
Analysis 15.5. Comparison 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise, Outcome 5 Participant withdrawal from study.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise

Outcome: 5 Participant withdrawal from study

Study or subgroup	Intensive exercise n/N	Home exercise n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
Binder 2004	14/46	8/44		1.67 [0.78, 3.59]



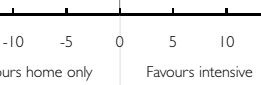
Analysis 15.6. Comparison 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise, Outcome 6 Functional status and activities of daily living at 6 months.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise

Outcome: 6 Functional status and activities of daily living at 6 months

Study or subgroup	Intensive exercise N	Mean(SD)	Home exercise N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Functional Status Questionnaire score (0 to 36: best)						
Binder 2004	40	27.3 (5.7)	43	24.8 (5.6)		2.50 [0.07, 4.93]
2 Instrumental ADL score (0 to 14: fully competent)						
Binder 2004	40	11.9 (2.6)	43	11.3 (2.5)		0.60 [-0.50, 1.70]
3 Basic ADL score (0 to 14: fully independent)						
Binder 2004	41	13.2 (1.2)	43	12.8 (1.3)		0.40 [-0.13, 0.93]



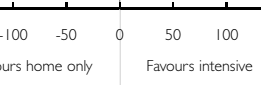
Analysis 15.7. Comparison 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise, Outcome 7 Quality of life at 6 months.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise

Outcome: 7 Quality of life at 6 months

Study or subgroup	Intensive exercise N	Mean(SD)	Home exercise N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 SF-36 Physical Function subscale (0 to 100: best)						
Binder 2004	41	74 (22)	42	63 (27)		11.00 [0.42, 21.58]
2 SF-36 Social Function subscale (0 to 100: best)						
Binder 2004	41	92 (16)	42	87 (24)		5.00 [-3.76, 13.76]
3 Hip Rating Questionnaire Score (0 to 100: best)						
Binder 2004	41	84 (11)	42	80 (11)		4.00 [-0.73, 8.73]



Analysis 15.8. Comparison 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise, Outcome 8 Strength: knee extension on fractured side (feet/pound).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 15 Supervised intensive physical therapy and exercise training versus low-intensity home exercise

Outcome: 8 Strength: knee extension on fractured side (feet/pound)

Study or subgroup	Intensive exercise N	Mean(SD)	Home exercise N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Binder 2004	36	55.6 (25.1)	41	42.2 (19.8)		13.40 [3.20, 23.60]

Analysis 16.1. Comparison 16 Home-based high-intensity resistance or aerobic training versus control, Outcome 1 Gait at 12 weeks.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 16 Home-based high-intensity resistance or aerobic training versus control

Outcome: 1 Gait at 12 weeks

Study or subgroup	Exercise training N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Free gait speed (metres/second)						
Mangione 2005	11	0.75 (0.27)	10	0.65 (0.23)		0.10 [-0.11, 0.31]
2 6-minute walk distance (metres)						
Mangione 2005	11	300.91 (108.04)	10	266.2 (82.4)		34.71 [-47.05, 116.47]

Analysis 16.2. Comparison 16 Home-based high-intensity resistance or aerobic training versus control, Outcome 2 Functional ability: SF-36 Physical function (0 to 100: best).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 16 Home-based high-intensity resistance or aerobic training versus control

Outcome: 2 Functional ability: SF-36 Physical function (0 to 100: best)

Study or subgroup	Resistance training N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Mangione 2005	11	57.6 (22.83)	10	48 (18.9)		9.60 [-8.27, 27.47]

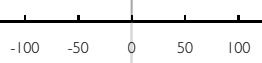
Analysis 16.3. Comparison 16 Home-based high-intensity resistance or aerobic training versus control, Outcome 3 Strength: maximum voluntary isometric force of the lower extremity (kg).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 16 Home-based high-intensity resistance or aerobic training versus control

Outcome: 3 Strength: maximum voluntary isometric force of the lower extremity (kg)

Study or subgroup	Resistance training N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Mangione 2005	11	63.51 (20.45)	10	67.7 (22.2)		-4.19 [-22.50, 14.12]



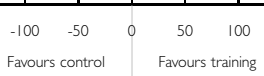
Analysis 17.1. Comparison 17 Home-based high-intensity resistance training versus control, Outcome 1 Gait at 12 weeks.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 17 Home-based high-intensity resistance training versus control

Outcome: 1 Gait at 12 weeks

Study or subgroup	Resistance training N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Free gait speed (metres/second)						
Mangione 2005	11	0.71 (0.28)	10	0.65 (0.23)		0.06 [-0.16, 0.28]
2 6-minute walk distance (metres)						
Mangione 2005	11	278.9 (114.6)	10	266.2 (82.4)		12.70 [-72.12, 97.52]



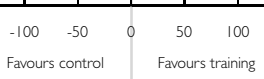
Analysis 17.2. Comparison 17 Home-based high-intensity resistance training versus control, Outcome 2 Functional ability: SF-36 Physical function (0 to 100: best).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 17 Home-based high-intensity resistance training versus control

Outcome: 2 Functional ability: SF-36 Physical function (0 to 100: best)

Study or subgroup	Resistance training N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Mangione 2005	11	57.7 (21.1)	10	48 (18.9)		9.70 [-7.41, 26.81]



Analysis 17.3. Comparison 17 Home-based high-intensity resistance training versus control, Outcome 3 Strength: maximum voluntary isometric force of the lower extremity (kg).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 17 Home-based high-intensity resistance training versus control

Outcome: 3 Strength: maximum voluntary isometric force of the lower extremity (kg)

Study or subgroup	Resistance training N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Mangione 2005	11	59.6 (18.2)	10	67.7 (22.2)		-8.10 [-25.56, 9.36]

Analysis 18.1. Comparison 18 Home-based aerobic training versus control, Outcome 1 Gait at 12 weeks.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 18 Home-based aerobic training versus control

Outcome: 1 Gait at 12 weeks

Study or subgroup	Aerobic training N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Free gait speed (metres/second)						
Mangione 2005	12	0.79 (0.26)	10	0.65 (0.23)		0.14 [-0.06, 0.34]
2 6-minute walk distance (metres)						
Mangione 2005	12	321.1 (101.7)	10	266.2 (82.4)		54.90 [-22.04, 131.84]

Analysis 18.2. Comparison 18 Home-based aerobic training versus control, Outcome 2 Functional ability: SF-36 Physical function (0 to 100: best).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 18 Home-based aerobic training versus control

Outcome: 2 Functional ability: SF-36 Physical function (0 to 100: best)

Study or subgroup	Aerobic training N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Mangione 2005	12	57.5 (24.3)	10	48 (18.9)		9.50 [-8.56, 27.56]

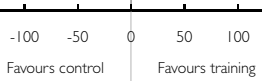
Analysis 18.3. Comparison 18 Home-based aerobic training versus control, Outcome 3 Strength: maximum voluntary isometric force of the lower extremity (kg).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 18 Home-based aerobic training versus control

Outcome: 3 Strength: maximum voluntary isometric force of the lower extremity (kg)

Study or subgroup	Aerobic training N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Mangione 2005	12	67.1 (22.3)	10	67.7 (22.2)		-0.60 [-19.27, 18.07]



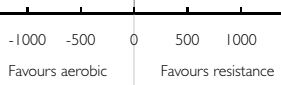
Analysis 19.1. Comparison 19 Home-based high-intensity resistance training versus aerobic training, Outcome 1 Gait at 12 weeks.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 19 Home-based high-intensity resistance training versus aerobic training

Outcome: 1 Gait at 12 weeks

Study or subgroup	Resistance training N	Mean(SD)	Aerobic training N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Free gait speed (metres/second)						
Mangione 2005	11	0.71 (0.28)	12	0.79 (0.26)		-0.08 [-0.30, 0.14]
2 6-minute walk distance (metres)						
Mangione 2005	11	278.9 (114.6)	12	321.1 (101.7)		-42.20 [-131.07, 46.67]



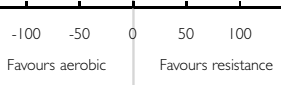
Analysis 19.2. Comparison 19 Home-based high-intensity resistance training versus aerobic training, Outcome 2 Functional ability: SF-36 Physical function (0 to 100: best).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 19 Home-based high-intensity resistance training versus aerobic training

Outcome: 2 Functional ability: SF-36 Physical function (0 to 100: best)

Study or subgroup	Resistance training N	Mean(SD)	Aerobic training N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Mangione 2005	11	57.7 (21.1)	12	57.5 (24.3)		0.20 [-18.36, 18.76]



Analysis 19.3. Comparison 19 Home-based high-intensity resistance training versus aerobic training, Outcome 3 Strength: maximum voluntary isometric force of the lower extremity (kg).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 19 Home-based high-intensity resistance training versus aerobic training

Outcome: 3 Strength: maximum voluntary isometric force of the lower extremity (kg)

Study or subgroup	Resistance training N	Mean(SD)	Aerobic training N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Mangione 2005	11	59.6 (18.2)	12	67.1 (22.3)		-7.50 [-24.08, 9.08]

Analysis 20.1. Comparison 20 Home-based exercises programme (started at 22 weeks) versus control, Outcome 1 Mobility.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 20 Home-based exercises programme (started at 22 weeks) versus control

Outcome: 1 Mobility

Study or subgroup	Exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Cannot walk indoors unaided				
Sherrington 2004	28/72	16/36		0.88 [0.55, 1.39]
2 Cannot walk outdoors unaided				
Sherrington 2004	50/72	26/36		0.96 [0.75, 1.24]
3 Does not walk for exercise				
Sherrington 2004	26/72	14/36		0.93 [0.56, 1.55]
4 Unable to walk 800m				
Sherrington 2004	24/72	15/36		0.80 [0.48, 1.33]
5 Unable to climb flight of stairs				
Sherrington 2004	20/72	11/36		0.91 [0.49, 1.69]
6 Unable to do heavy housework				
Sherrington 2004	45/72	24/36		0.94 [0.70, 1.26]
7 Does not participate in sports				
Sherrington 2004	67/72	35/36		0.96 [0.88, 1.04]

Analysis 20.2. Comparison 20 Home-based exercises programme (started at 22 weeks) versus control, Outcome 2 Physical Performance and Mobility Examination score (0:failure to 12:top score).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 20 Home-based exercises programme (started at 22 weeks) versus control

Outcome: 2 Physical Performance and Mobility Examination score (0:failure to 12:top score)

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Sherrington 2004	69	10.4 (1.92)	36	10.1 (1.8)		0.30 [-0.44, 1.04]

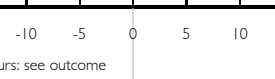
Analysis 20.3. Comparison 20 Home-based exercises programme (started at 22 weeks) versus control, Outcome 3 Gait parameters.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 20 Home-based exercises programme (started at 22 weeks) versus control

Outcome: 3 Gait parameters

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Time to walk 6m at a comfortable pace (s) (Effect direction: Favours exercises: Favours control)						
Sherrington 2004	69	12.5 (11.29)	36	13.2 (11.7)		-0.70 [-5.36, 3.96]
2 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours control: Favours exercises)						
Sherrington 2004	69	17.78 (9.17)	36	17.2 (9.4)		0.58 [-3.18, 4.34]
3 Time to walk 6m at a fast pace (s) (Effect direction: Favours exercises: Favours control)						
Sherrington 2004	69	9.57 (10.02)	36	11 (11.6)		-1.43 [-5.90, 3.04]
4 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours control: Favours exercises)						
Sherrington 2004	69	15.99 (8.57)	36	16.3 (9.9)		-0.31 [-4.12, 3.50]



Analysis 20.4. Comparison 20 Home-based exercises programme (started at 22 weeks) versus control, Outcome 4 Functional performance tests.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 20 Home-based exercises programme (started at 22 weeks) versus control

Outcome: 4 Functional performance tests

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Timed sit-to-stand x5 (seconds)						
Sherrington 2004	69	19.2 (12.56)	36	23.2 (15.4)		-4.00 [-9.84, 1.84]
2 Timed supine-to-sit (seconds)						
Sherrington 2004	69	4.5 (7.08)	36	4.1 (3.5)		0.40 [-1.62, 2.42]

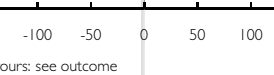
Analysis 20.5. Comparison 20 Home-based exercises programme (started at 22 weeks) versus control, Outcome 5 Balance.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 20 Home-based exercises programme (started at 22 weeks) versus control

Outcome: 5 Balance

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Step test fractured leg (steps) (Effect direction: Favours control: Favours exercises)						
Sherrington 2004	68	10.18 (6.51)	36	9 (7.3)		1.18 [-1.66, 4.02]
2 Step test non-fractured leg (steps) (Effect direction: Favours control: Favours exercises)						
Sherrington 2004	68	10.36 (5.85)	36	9.9 (7.2)		0.46 [-2.27, 3.19]
3 Functional reach (cm) (Effect direction: Favours control: Favours exercises)						
Sherrington 2004	68	22.28 (8.45)	36	19.4 (10)		2.88 [-0.95, 6.71]
4 Sway distance floor (mm) (Effect direction: Favours exercises: Favours control)						
Sherrington 2004	68	74.37 (49.62)	36	89.8 (59.9)		-15.43 [-38.28, 7.42]
5 Sway distance foam (mm) (Effect direction: Favours exercises: Favours control)						
Sherrington 2004	68	118.94 (79.05)	36	129 (79.4)		-10.06 [-42.09, 21.97]



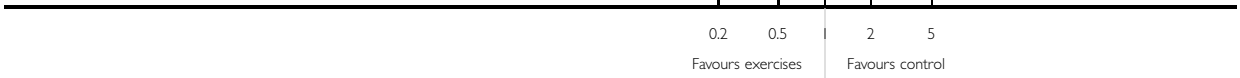
Analysis 20.6. Comparison 20 Home-based exercises programme (started at 22 weeks) versus control, Outcome 6 Subjective rating of pain, fall risk, balance, sleep quality and general health.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 20 Home-based exercises programme (started at 22 weeks) versus control

Outcome: 6 Subjective rating of pain, fall risk, balance, sleep quality and general health

Study or subgroup	Exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Moderate or worse pain				
Sherrington 2004	17/72	8/36		1.06 [0.51, 2.22]
2 Considered themselves as at moderate or high risk of falling				
Sherrington 2004	41/72	20/36		1.03 [0.72, 1.46]
3 Unsteady balance				
Sherrington 2004	53/72	32/36		0.83 [0.69, 0.99]
4 Sleep quality: not good				
Sherrington 2004	33/72	21/36		0.79 [0.54, 1.14]
5 Only good or worse general health				
Sherrington 2004	57/72	26/36		1.10 [0.87, 1.39]



Analysis 20.7. Comparison 20 Home-based exercises programme (started at 22 weeks) versus control, Outcome 7 Fell at least once during intervention period (4 months).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 20 Home-based exercises programme (started at 22 weeks) versus control

Outcome: 7 Fell at least once during intervention period (4 months)

Study or subgroup	Exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
Sherrington 2004	22/72	15/36		0.73 [0.44, 1.23]

Analysis 20.8. Comparison 20 Home-based exercises programme (started at 22 weeks) versus control, Outcome 8 Mortality.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 20 Home-based exercises programme (started at 22 weeks) versus control

Outcome: 8 Mortality

Study or subgroup	Exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
Sherrington 2004	4/80	1/40		2.00 [0.23, 17.31]

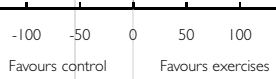
Analysis 20.9. Comparison 20 Home-based exercises programme (started at 22 weeks) versus control, Outcome 9 Strength measures (newtons).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 20 Home-based exercises programme (started at 22 weeks) versus control

Outcome: 9 Strength measures (newtons)

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Hip abduction fractured leg						
Sherrington 2004	66	57.08 (26.11)	36	53 (28)		4.08 [-7.03, 15.19]
2 Hip abduction non-fractured leg						
Sherrington 2004	66	70.45 (29.26)	36	64.8 (30.1)		5.65 [-6.45, 17.75]
3 Hip flexion fractured leg						
Sherrington 2004	66	49.83 (25.75)	36	43.3 (26.4)		6.53 [-4.10, 17.16]
4 Hip flexion non-fractured leg						
Sherrington 2004	66	61.88 (27.36)	36	55.3 (26.7)		6.58 [-4.36, 17.52]
5 Knee extension fractured leg						
Sherrington 2004	66	138.84 (62.76)	36	112.9 (73)		25.94 [-2.31, 54.19]
6 Knee extension non-fractured leg						
Sherrington 2004	66	161.8 (70.31)	36	139.2 (78.9)		22.60 [-8.25, 53.45]



Analysis 21.1. Comparison 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control, Outcome 1 Mobility.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control

Outcome: 1 Mobility

Study or subgroup	Exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Cannot walk indoors unaided				
Sherrington 2004	14/35	16/36		0.90 [0.52, 1.55]
2 Cannot walk outdoors unaided				
Sherrington 2004	27/35	26/36		1.07 [0.81, 1.40]
3 Does not walk for exercise				
Sherrington 2004	14/35	14/36		1.03 [0.58, 1.83]
4 Unable to walk 800m				
Sherrington 2004	14/35	15/36		0.96 [0.55, 1.68]
5 Unable to climb flight of stairs				
Sherrington 2004	10/35	11/36		0.94 [0.46, 1.92]
6 Unable to do heavy housework				
Sherrington 2004	23/35	24/36		0.99 [0.71, 1.37]
7 Does not participate in sports				
Sherrington 2004	34/35	35/36		1.00 [0.92, 1.08]

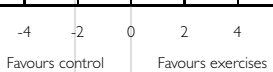
Analysis 21.2. Comparison 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control, Outcome 2 Physical Performance and Mobility Examination score (0:failure to 12:top score).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control

Outcome: 2 Physical Performance and Mobility Examination score (0:failure to 12:top score)

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Sherrington 2004	33	10.3 (2.3)	36	10.1 (1.8)		0.20 [-0.78, 1.18]



Analysis 21.3. Comparison 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control, Outcome 3 Gait parameters.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control

Outcome: 3 Gait parameters

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Time to walk 6m at a comfortable pace (s) (Effect direction: Favours exercises: Favours control)						
Sherrington 2004	33	11.8 (9.2)	36	13.2 (11.7)		-1.40 [-6.35, 3.55]
2 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours control: Favours exercises)						
Sherrington 2004	33	18.3 (11)	36	17.2 (9.4)		1.10 [-3.75, 5.95]
3 Time to walk 6m at a fast pace (s) (Effect direction: Favours exercises: Favours control)						
Sherrington 2004	33	9.2 (9.1)	36	11 (11.6)		-1.80 [-6.70, 3.10]
4 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours control: Favours exercises)						
Sherrington 2004	33	16.3 (10.7)	36	16.3 (9.9)		0.0 [-4.88, 4.88]

Favours: see outcome

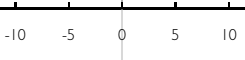
Analysis 21.4. Comparison 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control, Outcome 4 Functional performance tests.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control

Outcome: 4 Functional performance tests

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Timed sit-to-stand x5 (seconds)						
Sherrington 2004	33	18 (12.4)	36	23.2 (15.4)		-5.20 [-11.77, 1.37]
2 Timed supine-to-sit (seconds)						
Sherrington 2004	33	3.4 (3.5)	36	4.1 (3.5)		-0.70 [-2.35, 0.95]



Favours exercises Favours control

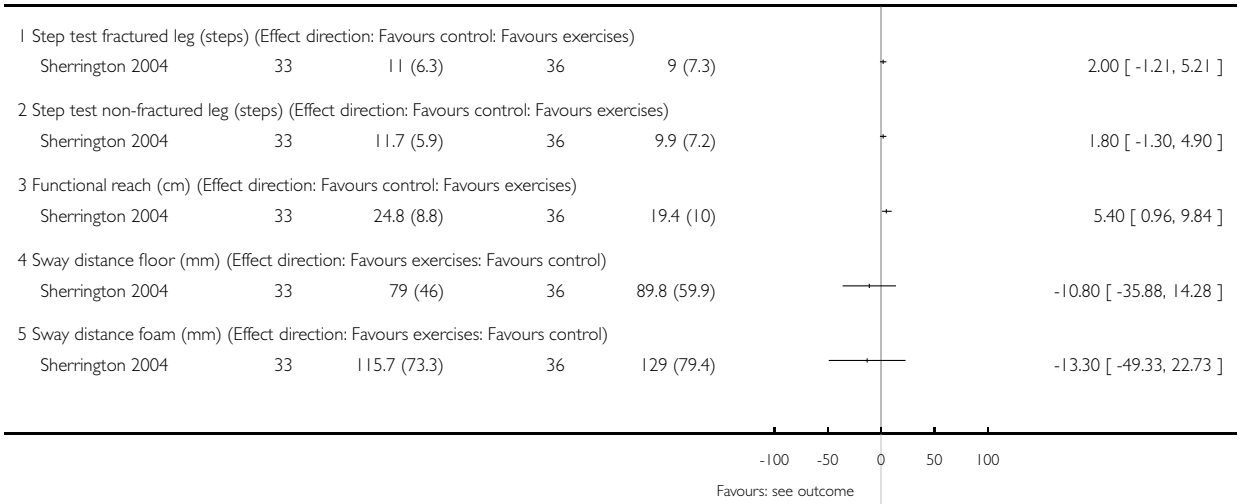
Analysis 21.5. Comparison 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control, Outcome 5 Balance.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control

Outcome: 5 Balance

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Step test fractured leg (steps) (Effect direction: Favours control: Favours exercises)						
Sherrington 2004	33	11 (6.3)	36	9 (7.3)		2.00 [-1.21, 5.21]
2 Step test non-fractured leg (steps) (Effect direction: Favours control: Favours exercises)						
Sherrington 2004	33	11.7 (5.9)	36	9.9 (7.2)		1.80 [-1.30, 4.90]
3 Functional reach (cm) (Effect direction: Favours control: Favours exercises)						
Sherrington 2004	33	24.8 (8.8)	36	19.4 (10)		5.40 [0.96, 9.84]
4 Sway distance floor (mm) (Effect direction: Favours exercises: Favours control)						
Sherrington 2004	33	79 (46)	36	89.8 (59.9)		-10.80 [-35.88, 14.28]
5 Sway distance foam (mm) (Effect direction: Favours exercises: Favours control)						
Sherrington 2004	33	115.7 (73.3)	36	129 (79.4)		-13.30 [-49.33, 22.73]



Analysis 21.6. Comparison 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control, Outcome 6 Subjective rating of pain, fall risk, balance, sleep quality and general health.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control

Outcome: 6 Subjective rating of pain, fall risk, balance, sleep quality and general health

Study or subgroup	Exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Moderate or worse pain				
Sherrington 2004	10/35	8/36		1.29 [0.57, 2.88]
2 Considered themselves as at moderate or high risk of falling				
Sherrington 2004	21/35	20/36		1.08 [0.73, 1.61]
3 Unsteady balance				
Sherrington 2004	26/35	32/36		0.84 [0.67, 1.05]
4 Sleep quality: not good				
Sherrington 2004	17/35	21/36		0.83 [0.54, 1.29]
5 Only good or worse general health				
Sherrington 2004	29/35	26/36		1.15 [0.89, 1.48]

Analysis 21.7. Comparison 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control, Outcome 7 Fell at least once during intervention period (4 months).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control

Outcome: 7 Fell at least once during intervention period (4 months)

Study or subgroup	Exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
Sherrington 2004	11/35	15/36		0.75 [0.40, 1.41]

Analysis 21.8. Comparison 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control, Outcome 8 Mortality.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control

Outcome: 8 Mortality

Study or subgroup	Exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
Sherrington 2004	3/40	1/40		3.00 [0.33, 27.63]

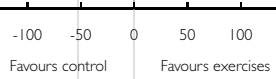
Analysis 21.9. Comparison 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control, Outcome 9 Strength measures (newtons).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 21 Home-based weight bearing exercises programme (started at 22 weeks) versus control

Outcome: 9 Strength measures (newtons)

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Hip abduction fractured leg						
Sherrington 2004	32	57.9 (27.9)	36	53 (28)		4.90 [-8.41, 18.21]
2 Hip abduction non-fractured leg						
Sherrington 2004	32	72.2 (31.3)	36	64.8 (30.1)		7.40 [-7.24, 22.04]
3 Hip flexion fractured leg						
Sherrington 2004	32	50.4 (28.3)	36	43.3 (26.4)		7.10 [-5.96, 20.16]
4 Hip flexion non-fractured leg						
Sherrington 2004	32	60.8 (29.4)	36	55.3 (26.7)		5.50 [-7.91, 18.91]
5 Knee extension fractured leg						
Sherrington 2004	32	152.9 (75.9)	36	112.9 (73)		40.00 [4.50, 75.50]
6 Knee extension non-fractured leg						
Sherrington 2004	32	172 (79.6)	36	139.2 (78.9)		32.80 [-4.95, 70.55]



Analysis 22.1. Comparison 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control, Outcome 1 Mobility.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control

Outcome: 1 Mobility

Study or subgroup	Exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Cannot walk indoors unaided				
Sherrington 2004	14/37	16/36		0.85 [0.49, 1.48]
2 Cannot walk outdoors unaided				
Sherrington 2004	23/37	26/36		0.86 [0.62, 1.19]
3 Does not walk for exercise				
Sherrington 2004	12/37	14/36		0.83 [0.45, 1.55]
4 Unable to walk 800m				
Sherrington 2004	10/37	15/36		0.65 [0.34, 1.25]
5 Unable to climb flight of stairs				
Sherrington 2004	10/37	11/36		0.88 [0.43, 1.82]
6 Unable to do heavy housework				
Sherrington 2004	22/37	24/36		0.89 [0.63, 1.27]
7 Does not participate in sports				
Sherrington 2004	33/37	35/36		0.92 [0.81, 1.04]

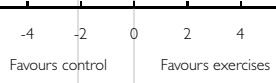
Analysis 22.2. Comparison 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control, Outcome 2 Physical Performance and Mobility Examination score (0:failure to 12:top score).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control

Outcome: 2 Physical Performance and Mobility Examination score (0:failure to 12:top score)

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Sherrington 2004	36	10.5 (1.5)	36	10.1 (1.8)		0.40 [-0.37, 1.17]



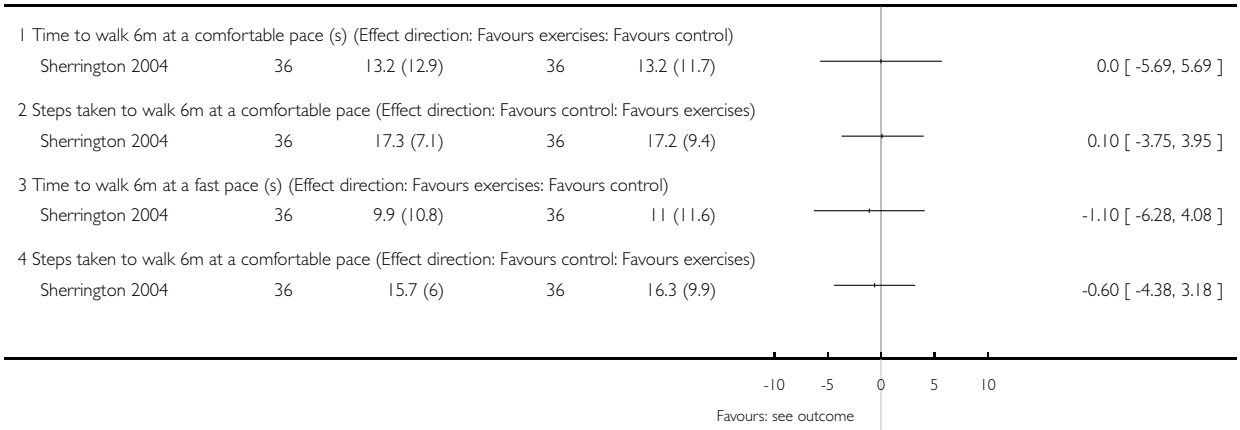
Analysis 22.3. Comparison 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control, Outcome 3 Gait parameters.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control

Outcome: 3 Gait parameters

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Time to walk 6m at a comfortable pace (s) (Effect direction: Favours exercises: Favours control)						
Sherrington 2004	36	13.2 (12.9)	36	13.2 (11.7)		0.0 [-5.69, 5.69]
2 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours control: Favours exercises)						
Sherrington 2004	36	17.3 (7.1)	36	17.2 (9.4)		0.10 [-3.75, 3.95]
3 Time to walk 6m at a fast pace (s) (Effect direction: Favours exercises: Favours control)						
Sherrington 2004	36	9.9 (10.8)	36	11 (11.6)		-1.10 [-6.28, 4.08]
4 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours control: Favours exercises)						
Sherrington 2004	36	15.7 (6)	36	16.3 (9.9)		-0.60 [-4.38, 3.18]



Analysis 22.4. Comparison 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control, Outcome 4 Functional performance tests.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control

Outcome: 4 Functional performance tests

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Timed sit-to-stand x5 (seconds)						
Sherrington 2004	36	20.3 (12.7)	36	23.2 (15.4)		-2.90 [-9.42, 3.62]
2 Timed supine-to-sit (seconds)						
Sherrington 2004	36	5.5 (9.2)	36	4.1 (3.5)		1.40 [-1.82, 4.62]

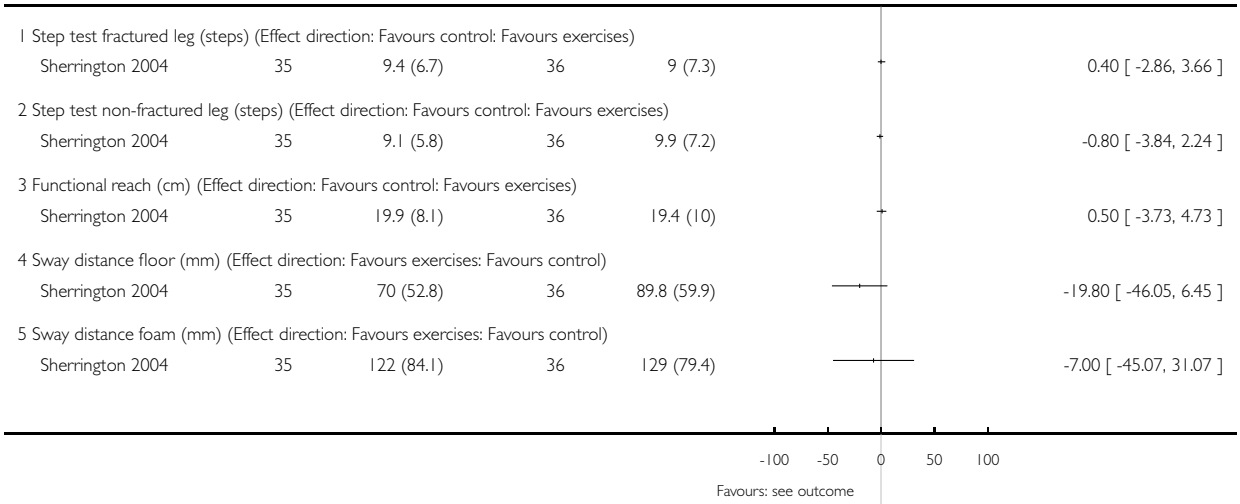
Analysis 22.5. Comparison 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control, Outcome 5 Balance.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control

Outcome: 5 Balance

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Step test fractured leg (steps) (Effect direction: Favours control: Favours exercises)						
Sherrington 2004	35	9.4 (6.7)	36	9 (7.3)		0.40 [-2.86, 3.66]
2 Step test non-fractured leg (steps) (Effect direction: Favours control: Favours exercises)						
Sherrington 2004	35	9.1 (5.8)	36	9.9 (7.2)		-0.80 [-3.84, 2.24]
3 Functional reach (cm) (Effect direction: Favours control: Favours exercises)						
Sherrington 2004	35	19.9 (8.1)	36	19.4 (10)		0.50 [-3.73, 4.73]
4 Sway distance floor (mm) (Effect direction: Favours exercises: Favours control)						
Sherrington 2004	35	70 (52.8)	36	89.8 (59.9)		-19.80 [-46.05, 6.45]
5 Sway distance foam (mm) (Effect direction: Favours exercises: Favours control)						
Sherrington 2004	35	122 (84.1)	36	129 (79.4)		-7.00 [-45.07, 31.07]



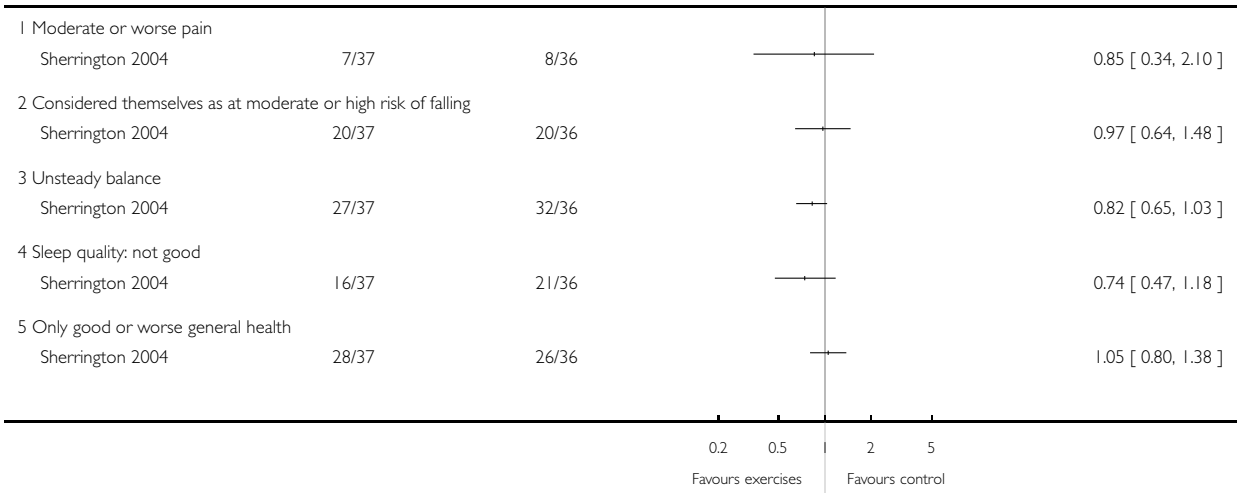
Analysis 22.6. Comparison 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control, Outcome 6 Subjective rating of pain, fall risk, balance, sleep quality and general health.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control

Outcome: 6 Subjective rating of pain, fall risk, balance, sleep quality and general health

Study or subgroup	Exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Moderate or worse pain				
Sherrington 2004	7/37	8/36		0.85 [0.34, 2.10]
2 Considered themselves as at moderate or high risk of falling				
Sherrington 2004	20/37	20/36		0.97 [0.64, 1.48]
3 Unsteady balance				
Sherrington 2004	27/37	32/36		0.82 [0.65, 1.03]
4 Sleep quality: not good				
Sherrington 2004	16/37	21/36		0.74 [0.47, 1.18]
5 Only good or worse general health				
Sherrington 2004	28/37	26/36		1.05 [0.80, 1.38]



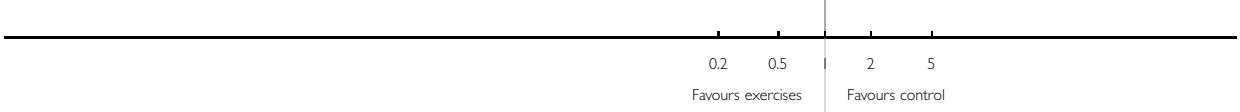
Analysis 22.7. Comparison 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control, Outcome 7 Fell at least once during intervention period (4 months).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control

Outcome: 7 Fell at least once during intervention period (4 months)

Study or subgroup	Exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
Sherrington 2004	11/37	15/36		0.71 [0.38, 1.34]



Analysis 22.8. Comparison 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control, Outcome 8 Mortality.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control

Outcome: 8 Mortality

Study or subgroup	Exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
Sherrington 2004	1/40	1/40		1.00 [0.06, 15.44]

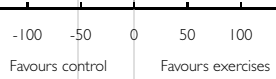
Analysis 22.9. Comparison 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control, Outcome 9 Strength measures (newtons).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 22 Home-based non-weight bearing exercises programme (started 22 at weeks) versus control

Outcome: 9 Strength measures (newtons)

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Hip abduction fractured leg						
Sherrington 2004	34	56.3 (24.3)	36	53 (28)		3.30 [-8.96, 15.56]
2 Hip abduction non-fractured leg						
Sherrington 2004	34	68.8 (27.2)	36	64.8 (30.1)		4.00 [-9.43, 17.43]
3 Hip flexion fractured leg						
Sherrington 2004	34	49.3 (23.1)	36	43.3 (26.4)		6.00 [-5.60, 17.60]
4 Hip flexion non-fractured leg						
Sherrington 2004	34	62.9 (25.3)	36	55.3 (26.7)		7.60 [-4.58, 19.78]
5 Knee extension fractured leg						
Sherrington 2004	34	125.6 (47.2)	36	112.9 (73)		12.70 [-15.94, 41.34]
6 Knee extension non-fractured leg						
Sherrington 2004	34	152.2 (60.3)	36	139.2 (78.9)		13.00 [-19.79, 45.79]



Analysis 23.1. Comparison 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks), Outcome 1 Mobility.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks)

Outcome: 1 Mobility

Study or subgroup	Weight-bear n/N	Non-weight-bear n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Cannot walk indoors unaided				
Sherrington 2004	14/35	14/37		1.06 [0.59, 1.89]
2 Cannot walk outdoors unaided				
Sherrington 2004	27/35	23/37		1.24 [0.91, 1.69]
3 Does not walk for exercise				
Sherrington 2004	14/35	12/37		1.23 [0.67, 2.29]
4 Unable to walk 800m				
Sherrington 2004	14/35	10/37		1.48 [0.76, 2.88]
5 Unable to climb flight of stairs				
Sherrington 2004	10/35	10/37		1.06 [0.50, 2.23]
6 Unable to do heavy housework				
Sherrington 2004	23/35	22/37		1.11 [0.77, 1.58]
7 Does not participate in sports				
Sherrington 2004	34/35	33/37		1.09 [0.96, 1.24]

Analysis 23.2. Comparison 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks), Outcome 2 Physical Performance and Mobility Examination score (0:failure to 12:top score).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks)

Outcome: 2 Physical Performance and Mobility Examination score (0:failure to 12:top score)

Study or subgroup	Weight-bear N	Mean(SD)	Non-weight-bear N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
Sherrington 2004	33	10.3 (2.3)	36	10.5 (1.5)		-0.20 [-1.13, 0.73]

Analysis 23.3. Comparison 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks), Outcome 3 Gait parameters.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks)

Outcome: 3 Gait parameters

Study or subgroup	Weight-bear N	Mean(SD)	Non-weight-bear N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Time to walk 6m at a comfortable pace (s) (Effect direction: Favours weight-bear: Favours non-w-bear)						
Sherrington 2004	33	11.8 (9.2)	36	13.2 (12.9)		-1.40 [-6.65, 3.85]
2 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours non-w-bear: Favours weight-bear)						
Sherrington 2004	33	18.3 (11)	36	17.3 (7.1)		1.00 [-3.41, 5.41]
3 Time to walk 6m at a fast pace (s) (Effect direction: Favours weight-bear: Favours non-w-bear)						
Sherrington 2004	33	9.2 (9.1)	36	9.9 (10.8)		-0.70 [-5.40, 4.00]
4 Steps taken to walk 6m at a comfortable pace (Effect direction: Favours non-w-bear: Favours weight-bear)						
Sherrington 2004	33	16.3 (10.7)	36	15.7 (6)		0.60 [-3.54, 4.74]

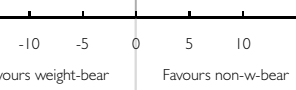
Analysis 23.4. Comparison 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks), Outcome 4 Functional performance tests.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks)

Outcome: 4 Functional performance tests

Study or subgroup	Weight-bear N	Mean(SD)	Non-weighty-bear N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Timed sit-to-stand x5 (seconds)						
Sherrington 2004	33	18 (12.4)	36	20.3 (12.7)		-2.30 [-8.23, 3.63]
2 Timed supine-to-sit (seconds)						
Sherrington 2004	33	3.4 (3.5)	36	5.5 (9.2)		-2.10 [-5.33, 1.13]



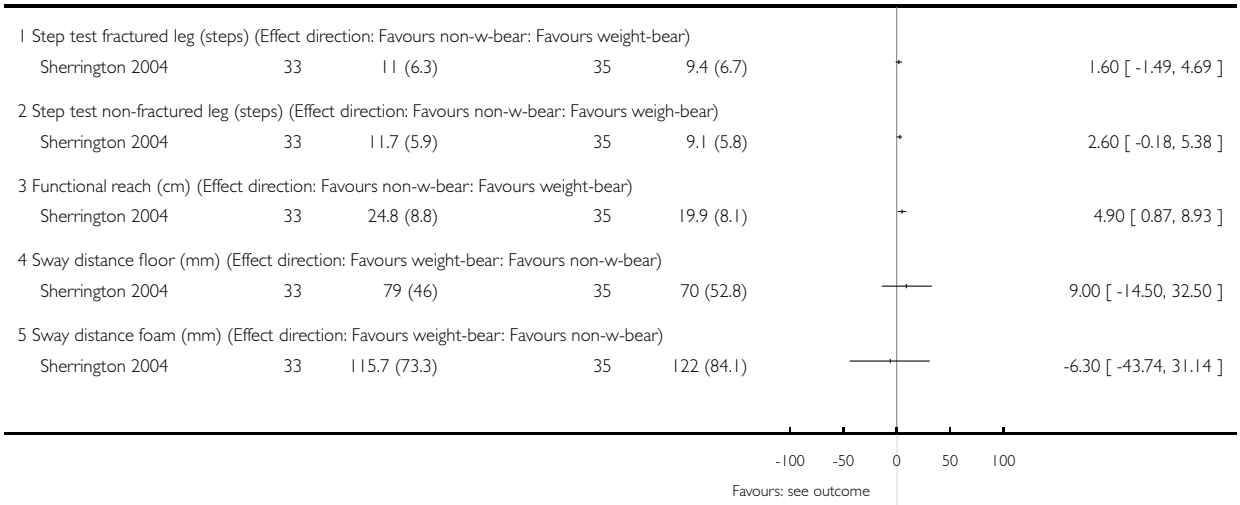
Analysis 23.5. Comparison 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks), Outcome 5 Balance.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks)

Outcome: 5 Balance

Study or subgroup	Weight-bear N	Mean(SD)	Non-weight-bear N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Step test fractured leg (steps) (Effect direction: Favours non-w-bear: Favours weight-bear)						
Sherrington 2004	33	11 (6.3)	35	9.4 (6.7)		1.60 [-1.49, 4.69]
2 Step test non-fractured leg (steps) (Effect direction: Favours non-w-bear: Favours weigh-bear)						
Sherrington 2004	33	11.7 (5.9)	35	9.1 (5.8)		2.60 [-0.18, 5.38]
3 Functional reach (cm) (Effect direction: Favours non-w-bear: Favours weight-bear)						
Sherrington 2004	33	24.8 (8.8)	35	19.9 (8.1)		4.90 [0.87, 8.93]
4 Sway distance floor (mm) (Effect direction: Favours weight-bear: Favours non-w-bear)						
Sherrington 2004	33	79 (46)	35	70 (52.8)		9.00 [-14.50, 32.50]
5 Sway distance foam (mm) (Effect direction: Favours weight-bear: Favours non-w-bear)						
Sherrington 2004	33	115.7 (73.3)	35	122 (84.1)		-6.30 [-43.74, 31.14]



Analysis 23.6. Comparison 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks), Outcome 6 Subjective rating of pain, fall risk, balance, sleep quality and general health.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks)

Outcome: 6 Subjective rating of pain, fall risk, balance, sleep quality and general health

Study or subgroup	Weight-bear n/N	Non-weight-bear n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Moderate or worse pain				
Sherrington 2004	10/35	7/37		1.51 [0.65, 3.53]
2 Considered themselves as at moderate or high risk of falling				
Sherrington 2004	21/35	20/37		1.11 [0.74, 1.66]
3 Unsteady balance				
Sherrington 2004	26/35	27/37		1.02 [0.77, 1.34]
4 Sleep quality: not good				
Sherrington 2004	17/35	16/37		1.12 [0.68, 1.86]
5 Only good or worse general health				
Sherrington 2004	29/35	28/37		1.09 [0.86, 1.39]

Analysis 23.7. Comparison 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks), Outcome 7 Fell at least once during intervention period (4 months).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks)

Outcome: 7 Fell at least once during intervention period (4 months)

Study or subgroup	Weight-bear n/N	Non-weight-bear n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
Sherrington 2004	11/35	11/37		1.06 [0.53, 2.12]

Analysis 23.8. Comparison 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks), Outcome 8 Mortality.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks)

Outcome: 8 Mortality

Study or subgroup	Weight-bear n/N	Non-weight-bear n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
Sherrington 2004	3/40	1/40		3.00 [0.33, 27.63]

Analysis 23.9. Comparison 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks), Outcome 9 Strength measures (newtons).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks)

Outcome: 9 Strength measures (newtons)

Study or subgroup	Weight-bear N	Mean(SD)	Non-weight-bear N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Hip abduction fractured leg						
Sherrington 2004	32	57.9 (27.9)	34	56.3 (24.3)		1.60 [-11.06, 14.26]
2 Hip abduction non-fractured leg						
Sherrington 2004	32	72.2 (31.3)	34	68.8 (27.2)		3.40 [-10.78, 17.58]
3 Hip flexion fractured leg						
Sherrington 2004	32	50.4 (28.3)	34	49.3 (23.1)		1.10 [-11.41, 13.61]
4 Hip flexion non-fractured leg						
Sherrington 2004	32	60.8 (29.4)	34	62.9 (25.3)		-2.10 [-15.37, 11.17]
5 Knee extension fractured leg						
Sherrington 2004	32	152.9 (75.9)	34	125.6 (47.2)		27.30 [-3.41, 58.01]
6 Knee extension non-fractured leg						
Sherrington 2004	32	172 (79.6)	34	152.2 (60.3)		19.80 [-14.43, 54.03]

Analysis 23.10. Comparison 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks), Outcome 10 Participant's participation in and perception of exercise programmes.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 23 Home-based weight bearing versus non-weight-bearing exercises programme (started at 22 weeks)

Outcome: 10 Participant's participation in and perception of exercise programmes

Study or subgroup	Weight-bear n/N	Non-weight-bear n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Had difficulty with exercises				
Sherrington 2004	6/35	0/37		13.72 [0.80, 234.89]
2 Experienced moderate or marked pain during exercise				
Sherrington 2004	10/35	5/37		2.11 [0.80, 5.57]
3 Exercises not considered even of moderate usefulness				
Sherrington 2004	10/35	9/37		1.17 [0.54, 2.54]
4 Had stopped exercises altogether (by 4 months)				
Sherrington 2004	7/35	7/37		1.06 [0.41, 2.71]
5 Exercises done less than 3 times weekly or not at all (by 4 months)				
Sherrington 2004	11/35	10/37		1.16 [0.57, 2.39]

Analysis 24.1. Comparison 24 Home-based exercises programme (started at 7 months), Outcome 1 Inability to perform weight-bearing test without hand support.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 24 Home-based exercises programme (started at 7 months)

Outcome: 1 Inability to perform weight-bearing test without hand support

Study or subgroup	Exercises n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Risk Ratio M-H,Fixed,95% CI
1 Use of 5.5 cm block: fractured leg				
Sherrington 1997	10/20	11/20		0.91 [0.50, 1.64]
2 Use of 5.5 cm block: non-fractured leg				
Sherrington 1997	6/20	11/20		0.55 [0.25, 1.19]
3 Use of 10.5 cm block: fractured leg				
Sherrington 1997	10/20	14/20		0.71 [0.42, 1.21]
4 Use of 10.5 cm block: fractured leg				
Sherrington 1997	6/20	11/20		0.55 [0.25, 1.19]

Analysis 24.2. Comparison 24 Home-based exercises programme (started at 7 months), Outcome 2 Gait parameters.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 24 Home-based exercises programme (started at 7 months)

Outcome: 2 Gait parameters

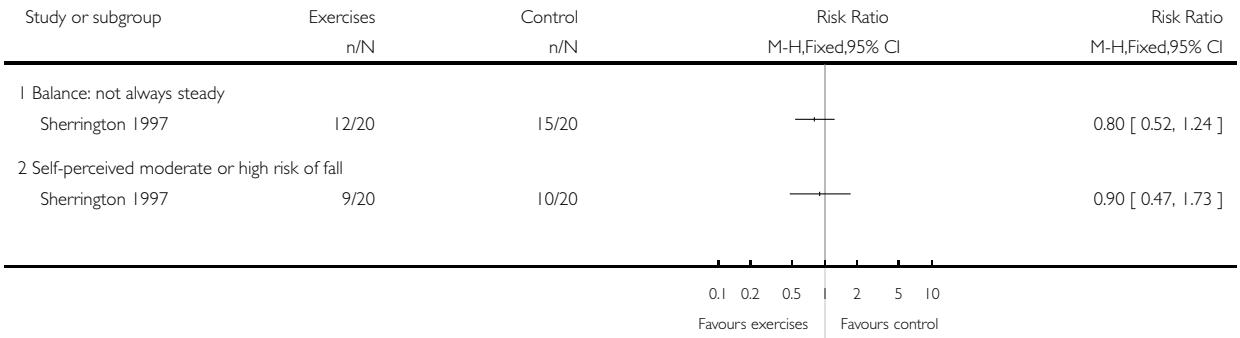
Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Velocity (m/sec)						
Sherrington 1997	20	0.51 (0.34)	20	0.5 (0.35)		0.01 [-0.20, 0.22]
2 Cadence: steps/minute						
Sherrington 1997	20	86.5 (29.5)	20	88.3 (35.3)		-1.80 [-21.96, 18.36]

Analysis 24.3. Comparison 24 Home-based exercises programme (started at 7 months), Outcome 3 Subjective rating of balance and fall risk.

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 24 Home-based exercises programme (started at 7 months)

Outcome: 3 Subjective rating of balance and fall risk

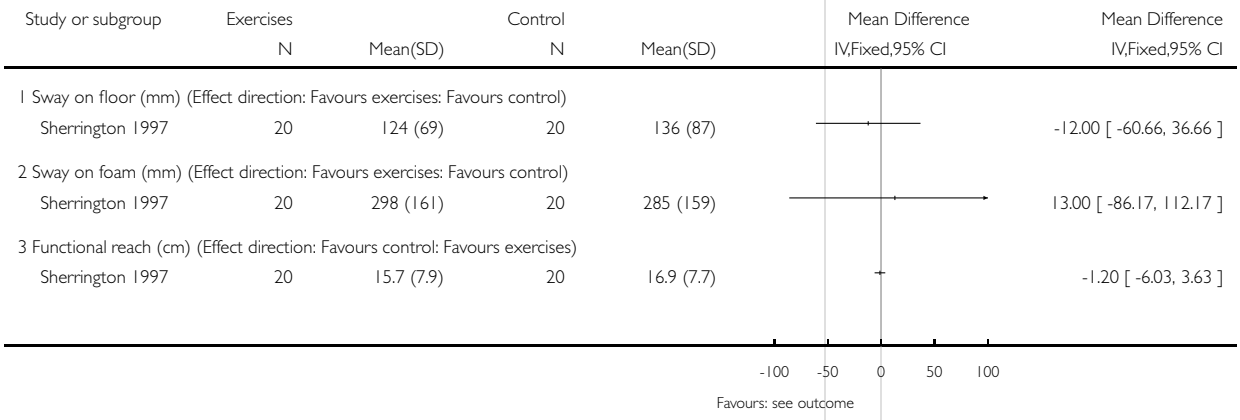


Analysis 24.4. Comparison 24 Home-based exercises programme (started at 7 months), Outcome 4 Balance (postural control).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 24 Home-based exercises programme (started at 7 months)

Outcome: 4 Balance (postural control)



Analysis 24.5. Comparison 24 Home-based exercises programme (started at 7 months), Outcome 5 Strength (kg).

Review: Interventions for improving mobility after hip fracture surgery in adults

Comparison: 24 Home-based exercises programme (started at 7 months)

Outcome: 5 Strength (kg)

Study or subgroup	Exercises N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Mean Difference IV,Fixed,95% CI
1 Quadriceps fractured leg						
Sherrington 1997	20	10.4 (4.9)	20	7.3 (3.7)		3.10 [0.41, 5.79]
2 Quadriceps non-fractured leg						
Sherrington 1997	20	12.9 (5.7)	20	9.4 (5.2)		3.50 [0.12, 6.88]

APPENDICES

Appendix 1. Types of outcome measures

Types of outcome measures sought in versions of the review before Issue 4, 2004

(1) Fracture healing complications.
(a) Surgical complications of fixation within the follow-up period of the study. This includes non-union of the fracture (the definition of non-union is that used within each individual study, and this outcome includes early re-displacement of the fracture), avascular necrosis and other complications as detailed in each individual study.
(b) Re-operation (within the follow-up period of the study).
(2) Post-operative course and complications.
(a) Any medical complication as detailed in each individual study. This includes pneumonia, thromboembolic complications (deep vein thrombosis or pulmonary embolism) and other complications as listed.
(b) Length of hospital stay (in days).
(c) Time until mobilisation and regain of muscle power.
(d) Post-operative walking ability and gait assessment.
(3) Anatomical restoration.
(a) Shortening (more than 2 centimetres).
(b) Varus deformity.
(c) External rotation deformity (more than 20 degrees).
(4) Final outcome measures.
(a) Mortality (within the follow-up period of the study).
(b) Pain (persistent pain at the final follow-up assessment).
(c) Return to living at home.
(d) Return of mobility, use of walking aids.
(e) Other functional outcomes as listed in each study.
(f) Health related quality of life measures.

Types of outcome measures sought in versions of the review before Issue 2, 2010

While the outcomes sought remain basically unchanged from previous versions (*see* above), this section was restructured to emphasise the main focus of the interventions, which is to safely restore or enhance mobility, and to apply to the whole rehabilitation period.
(1) Mobility and other related functional outcomes (including impairment)
(a) Mobility/walking ability:

- restoration of pre-fracture mobility/walking ability;
- use of walking aids/need for assistance;
- time to mobilisation/regain of final mobility status.

(b) Gait assessment and other objective measures of impairment and function:

- various gait parameters, limp;
- functional performance measures: for example, timed up and go;
- strength, balance, range of motion.

(c) Falls and fear of falling.
(d) General functioning:

- return to living at home;
- other functional outcomes as listed in each study;
- health related quality of life measures: especially physical domains.

(e) Pain (persistent pain at the final follow-up assessment).
(2) Mortality and complications
(a) Mortality (within the follow-up period of the study).
(b) Fracture healing complications:

- surgical complications of fixation within the follow-up period of the study. This includes non-union of the fracture (the definition of non-union is that used within each individual study, and this outcome includes early re-displacement of the fracture), avascular necrosis and other complications as detailed in each individual study;
- re-operation (within the follow-up period of the study).

(c) Poor anatomical restoration:

- shortening (more than 2 centimetres);
- varus deformity;
- external rotation deformity (> 20 degrees).

(d) Post-operative medical complications as detailed in each individual study. These include pneumonia, thromboembolic complications (deep vein thrombosis or pulmonary embolism) and other complications as listed.
(3) Resources
The type of resources considered will depend on the context and stage of rehabilitation. These include length of hospital stay (in days), number of physiotherapy sessions, number of outpatient attendances and need for special care.
(4) Other
These include patient satisfaction and adherence to interventions.
Note: Prompted by editorial comments for the fourth update, we signal our intention to revise this list for the next update as follows:
(3) Patient satisfaction, including acceptability of interventions, and adherence
(4) Resources

Appendix 2. Search strategies (CENTRAL; MEDLINE; EMBASE; CINAHL)

Cochrane Central Register of Controlled Trials (CENTRAL) (Wiley InterScience interface) 2010, Issue 3

#1 MeSH descriptor Hip Fractures explode all trees
#2 ((hip* or ((femur* or femoral*) near (neck or proximal))) near fracture*) :ti or ((hip* or ((femur* or femoral*) near (neck or proximal))) near fracture*):ab
#3 (#1 OR #2)
#4 MeSH descriptor Gait explode all trees
#5 MeSH descriptor Movement, this term only
#6 MeSH descriptor Locomotion explode all trees
#7 MeSH descriptor Physical Therapy Modalities, this term only
#8 MeSH descriptor Exercise Therapy explode all trees
#9 MeSH descriptor Rehabilitation, this term only
#10 MeSH descriptor Early Ambulation, this term only
#11 ((early or delayed) next (weight bearing or mobili*)):ti or ((early or delayed) next (weight bearing or mobili*)):ab
#12 ((quadriceps or muscle or strength or gait) next (training or retraining)) :ti or ((quadriceps or muscle or strength or gait) next (training or retraining)):ab
#13 (#4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12)
#14 (#3 AND #13)

Search strategy for MEDLINE (OVID WEB)

1. exp Hip Fractures/
2. ((hip$ or ((femur$ or femoral$) adj3 (neck or proximal))) adj4 fracture$).tw.
3. or/1-2
4. Gait/ or Movement/ or exp Locomotion/
5. Physical Therapy Modalities/ or Exercise Therapy/ or Rehabilitation/ or Early ambulation/
6. ((early or delayed) adj (weight bearing or mobili$)).tw.
7. ((quadriceps or muscle or strength or gait) adj (training or retraining)).tw.
8. or/4-7
9. and/3,8

line 9 combined with the optimal trial search strategy

Search strategy for EMBASE (OVID WEB)

1. exp Hip Fracture/
2. ((hip$ or ((femur$ or femoral$) adj3 (neck or proximal))) adj4 fracture$).tw.
3. or/1-2
4. exp Locomotion/ or Limb Movement/ or "Movement (Physiology)"/
5. Physiotherapy/ or exp Kinesiotherapy/ or Rehabilitation/ or Mobilization/
6. ((early or delayed) adj (weight bearing or mobili$)).tw.
7. ((quadriceps or muscle or strength or gait) adj (training or retraining)).tw.
8. or/4-7
9. and/3,8
10. exp Randomized Controlled trial/
11. exp Double Blind Procedure/
12. exp Single Blind Procedure/
13. exp Crossover Procedure/
14. Controlled Study/
15. or/10-14
16. ((clinical or controlled or comparative or placebo or prospective$ or randomi#ed) adj3 (trial or study)).tw.
17. (random$ adj7 (allocat$ or allot$ or assign$ or basis$ or divid$ or order$)).tw.

18. ((singl$ or doubl$ or trebl$ or tripl$) adj7 (blind$ or mask$)).tw.
19. (cross?over$ or (cross adj1 over$)).tw.
20. ((allocat$ or allot$ or assign$ or divid$) adj3 (condition$ or experiment$ or intervention$ or treatment$ or therap$ or control$ or group$)).tw.
21. or/16-20
22. or/15,21
23. limit 22 to human
24. and/9,23

Search strategy for CINAHL (OVID WEB)

1. exp Hip Fractures/
2. ((hip$ or ((femur$ or femoral$) adj3 (neck or proximal))) adj4 fracture$).tw.
3. or/1-2
4. Rehabilitation/ or Early ambulation/ or Physical therapy/ or Gait Training/ or Therapeutic Exercise/ or Muscle Strengthening/
5. and/3-4
6. exp Clinical Trials/
7. exp Evaluation Research/
8. exp Comparative Studies/
9. exp Crossover Design/
10. clinical trial.pt.
11. or/6-10
12. ((clinical or controlled or comparative or placebo or prospective or randomi#ed) adj3 (trial or study)).tw.
13. (random$ adj7 (allocat$ or allot$ or assign$ or basis$ or divid$ or order$)).tw.
14. ((singl$ or doubl$ or trebl$ or tripl$) adj7 (blind$ or mask$)).tw.
15. (cross?over$ or (cross adj1 over$)).tw.
16. ((allocat$ or allot$ or assign$ or divid$) adj3 (condition$ or experiment$ or intervention$ or treatment$ or therap$ or control$ or group$)).tw.
17. or/12-16
18. or/11,17

Appendix 3. Previous methodological quality assessment tool (used up to Issue 2, 2010)

Criteria	Scores
1. Was there clear concealment of allocation?	Score 3 (and code A) if allocation clearly concealed (e.g. numbered sealed opaque envelopes drawn consecutively). Score 2 (and code B) if there was a possible chance of disclosure before allocation. Score 1 (and code B) if the method of allocation concealment or randomisation was not stated or was unclear. Score 0 (and code C) if allocation concealment was clearly not concealed such as those using quasi-randomisation (e.g. even or odd date of birth).
2. Were the inclusion and exclusion criteria clearly defined?	Score 1 if text states which patients were included and which excluded (including type of fracture). Otherwise score 0.
3. Were the outcomes of participants who withdrew or who were excluded after allocation described and included in an intention-to-treat analysis?	Score 1 if yes or text states that no withdrawals occurred or data are presented clearly showing 'participant flow' which allows this to be inferred. Otherwise score 0.

(*Continued*)

4. Were the treatment and control groups adequately described at entry and if so were the groups well matched, or appropriate covariate adjustment made?	Score 1 if at least four admission details given (e.g. age, sex, pre-injury mobility, function score, mental test score, fracture type, type of surgery) with either no important difference between groups or appropriate adjustment made. Otherwise score 0.
5. Were the care programmes other than the trial options identical?	Score 1 if text states they were or this can be inferred. Otherwise score 0.
6. Was compliance assessed with documentation of patients' actual ambulatory function (such as weight bearing)?	Score 1 if yes. Otherwise score 0.
7. Were all the outcome measures clearly defined in the text with a definition of any ambiguous terms encountered?	Score 1 if yes. Otherwise score 0.
8. Were the outcome assessors blind to assignment status?	Score 1 if assessors of anatomical restoration, pain and function at follow-up were blinded to treatment outcome. Otherwise score 0.
9. Was the timing of outcome measures appropriate?	A minimum of 12 months follow-up for all surviving participants. Score 1 if yes. Otherwise score 0.
10. Was loss to follow-up reported and if so were less than 5% of participants lost to follow-up?	Score 1 if yes. Otherwise score 0.

Footnotes

From the update of Issue 1, 2007, the scores of the individual items were no longer summed.

Appendix 4. Acknowledgements for previous versions of review

Acknowledgements
We thank the following for their comments and help at editorial review of the first version of the review: Prof William Gillespie, Prof Harley Gray (external referee: review only), Mr Peter Herbison (review only), Prof James Hutchison (external referee: protocol only), Prof Rajan Madhok, Ms Leeann Morton, Prof Gordon Murray (protocol only), Mr Anthony Pohl (external referee: review only) and Prof Marc Swiontkowski. We also thank Ms Hilda Bastian for her help with the Synopsis. For the first and second updates, we thank Mrs Lesley Gillespie for her help with the search strategy and trial retrieval, and Ms Leeann Morton and Prof William Gillespie for their help at editorial review. We thank Dr Yvonne Dynan for her contribution to the first two versions of the review and Ms Pernille Jensen for checking over a study report in Danish.

(*Continued*)

Dr Helen Handoll's work on the first two versions of the review was supported by the Chief Scientist Office, Department of Health, The Scottish Office, UK.

For the third update, we thank Mrs Lesley Gillespie for her help with the search strategy, trial retrieval and final editorial checks, Ms Judy Sherrington for proof reading, Prof William Gillespie, Mr Peter Herbison, Dr Janet Wale and Dr Meghan Donaldson (external referee) for their feedback and help at editorial review.
We would like to acknowledge the important contributions of Dr Martyn Parker as author of the first four versions of this review. Dr Parker, who initiated and designed the first version of this review and contributed greatly to the first three updates, resigned authorship due to his many other commitments.
For the fourth update, we thank Mrs Lesley Gillespie for her help with trial retrieval, Ms Lindsey Shaw and Dr Joanne Elliott for final editorial checks, and Prof William Gillespie, Dr Vicki Livingstone, Dr Janet Wale and Dr Meghan Donaldson (external referee) for their feedback and help at editorial review.

WHAT'S NEW

Last assessed as up-to-date: 30 June 2010.

Date	Event	Description
6 February 2011	New search has been performed	For this update, published in Issue 3, 2011, the main changes are: 1. Change in title to reflect better the scope of the review. 2. Search update to April 2010. 3. Six trials, including a total of 524 participants, were newly included in this update. Five were early post-surgical rehabilitation trials and one was a community rehabilitation trial. 4. Study selection resulted in the exclusion of nine trials, the placement of seven trials in ongoing studies and two trials in studies awaiting classification. 5. Revised inclusion criteria for interventions, including timing of start of intervention. 6. Restructured list of outcomes 7. Assessment of risk of bias replacing previous methodological quality assessment. 8. Enhanced descriptions of study populations and interventions. 9. Adoption of new review format and updating of Background and Discussion. 10. The conclusions of the review were revised to give a more appropriate emphasis to optimal strategies.
5 February 2011	New citation required and conclusions have changed	1. Authorship of the review has changed. 2. The conclusions of the review were revised to give a more appropriate emphasis to optimal strategies.

HISTORY

Protocol first published: Issue 3, 1999

Review first published: Issue 3, 2000

Date	Event	Description
24 July 2008	Amended	Converted to new review format.
31 October 2006	New citation required and conclusions have changed	The main changes for the fourth update of this review, published Issue 1, 2007, were as follows. 1. Date of search for trials was extended to January 2006. 2. Three studies were newly included (Binder 2004; Tsauo 2005; Mangione 2005), one of which was previously waiting assessment (Mangione 2005, formerly Mangione 2001) and one was previously an ongoing study (Binder 2004, formerly Binder 2001). All three trials took place after hospital discharge. 3. A study which was previously ongoing (Crotty 2003) has become Miller 2006 and is awaiting assessment. 4. One study (Braid 2001) previously listed as ongoing is now excluded. 5. Two newly identified studies were excluded (Licciardone 2004; Shyu 2005). 6. Adjustments were made to text and tables to conform to revised methodology and the Cochrane Style Guide. 7. The conclusions of the review were revised to accommodate the new studies. 8. Authorship of the review has changed. For details of previous updates, please see 'Notes'.

CONTRIBUTIONS OF AUTHORS

Martyn Parker (MP) initiated and designed the review and compiled the first draft of the review. Helen Handoll (HH) located the review studies, checked data entry and critically rewrote and completed the first draft. Three reviewers, Yvonne Dynan (YD), HH and MP performed independent quality assessment and data extraction of the included trials.

The first update was initiated and drafted by MP. HH located the review studies, checked data entry, contacted some of the trialists and critically rewrote and completed the first draft. All three listed authors (HH, MP, YD) performed independent quality assessment and data extraction of newly included trial materials.

The second update was initiated by MP. HH and MP located the review studies and contacted some of the trialists. HH, MP and Catherine Sherrington (CS) performed independent study selection, and quality assessment and data extraction of newly included trial materials. HH completed the first draft, which was checked and corrected by the other two review authors.

The third update was initiated by HH. CS and HH located the review studies and contacted trialists. HH, MP and CS performed independent study selection. HH and either MP or CS performed independent quality assessment and data extraction of newly included trial materials. HH completed the first draft, which was checked and corrected by the other two review authors.

The fourth update was initiated by HH. CS and HH located the review studies, contacted trialists, performed independent study selection, quality assessment and data extraction of newly included trial materials. Both authors worked on various parts of the review, which were then checked by the other author in turn.

The fifth update was initiated by HH. CS, HH and Jenson Mak (JM) located the review studies, contacted trialists, performed independent study selection, quality assessment and data extraction of newly included trial materials. HH completed the first draft, which was checked and corrected by the other two authors.

All named authors are guarantors of the review.

DECLARATIONS OF INTEREST

None known. However, as Catherine Sherrington is an active investigator in several randomised trials in this area, assessment of eligibility of these trials and quality assessment of the four included trials was done independently by two others. Independent data extraction and entry into RevMan, presentation and interpretation of these four trials were also performed.

SOURCES OF SUPPORT

Internal sources

- University of Teesside, Middlesbrough, UK.
- School of Physiotherapy, University of Sydney, Australia.

External sources

- National Health and Medical Research Council, Fellowship, Australia.

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

The key differences in this update (2011) are:

- Updated title to reflect better the scope of the review.
- Trials testing interventions started after the generally perceived recovery of around one year are now excluded.
- Trials testing mobilisation strategies with nutrition as a co-intervention are included.
- Types of outcomes were restructured, with the categorisation of primary and secondary outcomes .
- Risk of bias was assessed using the Cochrane 'Risk of bias' tool, replacing assessment of 10 aspects of methodological quality.

Originally, this review was confined to the topic of early weight bearing and mobilisation after internal fixation of intracapsular proximal femoral fractures in adults (Parker 1999). This was then expanded to include interventions that had been used in the mobilisation of all hip fracture patients after surgery and started in the first phase of rehabilitation, generally whilst the patient was in hospital (Handoll 2003). The third update extended the scope further to include mobilisation strategies applied in the later stages of rehabilitation, generally in the community (Handoll 2004).

NOTES

This review is an expansion of the scope of the review described in the title of the protocol 'Early weight bearing and mobilisation after internal fixation of intracapsular proximal femoral fractures in adults'.

The main changes for the first update of this review, published Issue 2, 2002, were:

1. Date of search for trials was extended to February 2002

2. One new study (Mitchell 2001) of quadriceps muscle training was included

3. Of the other seven newly identified studies, one was excluded, two were placed in 'Ongoing Studies' and four were placed in 'Studies Awaiting Assessment'

4. There was no substantive change to the conclusions of the review

The main changes for the second update of this review, published Issue 1, 2003, were:

1. Date of search for trials was extended to October 2002.

2. One new study (Lauridsen 2002) evaluating intensive physiotherapy was included.

3. Two newly identified studies were excluded (Barber 2002; Hauer 2002).

4. Additional details/results were added from the full publication of Lamb 2002, formerly Lamb 1998.

5. Availability of the full publication of Kuisma 2002, formerly Johnstone 1999, resulted in its exclusion.

6. The identification of 3 more ongoing trials (Cameron 2004; Crotty 2003; Sherrington 2002).

7. There was no substantive change to the conclusions of the review.

The main changes for the third update of this review, published Issue 4, 2004, were:

1. Expansion of the scope of the review to cover interventions aimed at initiating and enhancing mobilisation throughout the whole rehabilitation process.

2. Types of outcome measures and the order of presentation of the trials were revised upon reconsideration of the new scope of the review.

3. Date of search for trials was extended to May 2004.

4. Four studies were newly included. One (Sherrington 1993) applied to the early post-operative period; the other three (Hauer 2002; Sherrington 2004; Sherrington 1997) took place after hospital discharge.

5. Four newly identified studies were excluded (Crotty 2002; Hesse 2003; Lehmann 1961; Tinetti 1999).

6. Two previously ongoing studies are now excluded (Allegrante 2001; Maltby 2000) as is one trial previously awaiting assessment (Johnston 1995).

7. One trial (Binder 2001) previously awaiting assessment is now listed as an ongoing study.

8. One newly identified study (Mangione 2001) awaits assessment.

9. Various changes were made to comply with the Cochrane Style Guide.

10. The conclusions of the review were revised to accommodate the new scope of the review.

The main changes for the fourth update of this review, published Issue 1, 2007, are listed under 'History'. As planned, Catherine Sherrington has resumed the role of contact reviewer for this update.

INDEX TERMS

Medical Subject Headings (MeSH)

*Physical Therapy Modalities; Gait; Hip Fractures [*rehabilitation; surgery]; Locomotion; Movement; Program Evaluation; Randomized Controlled Trials as Topic; Weight-Bearing

MeSH check words

Aged; Humans; Middle Aged