Functional capacity evaluations for the prevention of occupational re-injuries in injured workers

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TABLE OF CONTENTS

[Intervention Review]

Functional capacity evaluations for the prevention of occupational re-injuries in injured workers

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ABSTRACT

Background

Functional capacity evaluation (FCE) has been widely used to assess workers' physical state of readiness to return to work (RTW) after an injury and to make recommendations for the time and capacity in which they might return. FCEs are also used to prevent re-injury after RTW. Despite being a commonly used tool, little is known about how effective FCE is in preventing occupational injuries.

Objectives

To assess the effectiveness of FCE-based return to work recommendations in preventing occupational re-injuries of injured workers compared with no intervention or alternative interventions.

Search strategy

We searched the following electronic databases: the Cochrane Central Register of Controlled Trials (*The Cochrane Library* 2009, Issue 4), MEDLINE (1966 to December 2009), EMBASE (1980 to December 2009), CINAHL (1980 to December 2009), PsycINFO (1983 to December 2009) and PEDro (1929 to December 2009). The searches were not restricted by date, language or type of publication.

Selection criteria

We included randomised controlled trials (RCTs) of FCE-based return to work recommendations for preventing occupational re-injuries in injured workers.

Data collection and analysis

Four authors (NM, ES, JV, ML), in pairs, independently selected studies for inclusion, extracted data and assessed risk of bias.

Main results

We found no studies that compared FCE to no intervention. We found one RCT with 372 participants in which a short-form of one FCE was compared to the standard long-form FCE (Isernhagen Work Systems). Outcomes were recurrence rates of re-injuries. There was no significant difference between the two forms of FCE.

We rated the overall quality of the evidence as low.

Authors' conclusions

There is no evidence for or against the effectiveness of FCE compared to no intervention. A short version of FCE showed similar effectiveness to a long version in preventing re-injury. More RCTs are needed.

PLAIN LANGUAGE SUMMARY

Functional capacity evaluations for preventing re-injuries in employees on returning to work

Functional capacity evaluation (FCE) is a method to assess physical capacity to perform certain tasks. It is believed that FCE can prevent re-injury if injured workers are assessed before they return to work and get proper recommendations on how to perform work tasks.

We found no studies that compared workers given FCE to workers given no intervention to evaluate the effectiveness in preventing re-injury of FCE. We found one RCT involving 372 injured workers that compared a short version of the FCE to an extensive version in which more bodily functions were tested. The short-form FCE produced a 43% reduction in physical assessment time. However, there was no difference between the two forms of FCE in terms of prevention of recurrence of occupational injuries. We therefore concluded that there is no evidence for or against the effectiveness of the length of the FCE in ensuring that those who do return will not suffer an injury relapse.

BACKGROUND

Functional capacity evaluation (FCE) is the most commonly used tool for assessing workers' capacity to perform certain tasks following injury. FCE is used to make recommendations for participation in work while considering the person's body functions and structures, environmental factors, personal factors and health status (Soer 2008, p. 394). The underlying assumption of FCE is that the injured worker's performance during this health examination, which is equal to or exceeds the physical requirements of their particular job, can lead to appropriate recommendations about when it is safe for them to return to work, what duties it is safe for them to perform, or both. It may thus reduce the risk of their re-injury upon returning to work (Isernhagen 1992; Hart 1993). Successful return to work following injury means that the worker is back at work performing pre-injury or modified tasks and does not have recurrent episodes of sickness absence.

FCE-based return to work recommendations are mainly based on physical capacities. However, return to work is a multidimensional phenomenon influenced by numerous other factors. These include personal factors such as age, previous history of pain, initial diagnosis, job satisfaction, expectations of recovery, self-efficacy beliefs, perceptions of disability and pain tolerance (Schonstein 2001; Heijbel 2006; Asante 2007; Busch 2007). Workers' ability to choose work tasks and working hours, employers' ability to provide restricted work or different jobs and medico-legal issues also have an impact on whether or how soon workers will return to work (Allen 2004; Johansson 2004; Johansson 2006).

Given the complexity of factors influencing injured workers' return, the validity of FCE in being able to predict safe return to work and thus lower recurrence rates has been questioned (Innes 1999; Reneman 2004; Reneman 2005). Nevertheless, FCE continues to be commonly used in the rehabilitation of workers in industrialised countries, such as the USA, Canada, Australia and parts of Europe, to make judgements on injured workers' performance potential or readiness for work following work-related musculoskeletal injuries (King 1998; Wyman 1999). The effectiveness of FCE-based recommendations to prevent occupational re-injuries after return to work, however, is unknown.

OBJECTIVES

The objective of this review is to assess the effectiveness of FCE-based return to work recommendations for the prevention of occupational re-injuries of injured workers compared with no intervention or alternative interventions.

METHODS

Criteria for considering studies for this review

Types of studies

We considered any type of randomised controlled trial (RCT), either clustered or individual, for inclusion in this review.

Types of participants

Participants were injured workers or claimants for workers' compensation.

Types of interventions

We included any evaluation of an injured worker's physical capabilities in relation to the physical demands of the job. The intervention should consist of one or more physical capacity measures assessed by a health professional and should result in a recommendation regarding the worker's physical capacity to safely return to work. The recommendation can relate to the time the worker would be considered fit, or to the adjustments to the workplace necessary for a healthy return to work.

Types of outcome measures

We considered any re-injury outcome measures after functional evaluation of injured workers, such as the time to return to work, the number of days on sick leave and the duration of workers' compensation claims.

Search methods for identification of studies

The searches were not restricted by date, language or publication status.

Electronic searches

We searched the following electronic databases:

- Cochrane Central Register of Controlled Trials (*The Cochrane Library* 2009, Issue 4)
- MEDLINE (1966 to December 2009);
- EMBASE (1980 to December 2009);
- CINAHL (1980 to December 2009);
- PsycINFO (1983 to December 2009); and
- PEDro (1929 to December 2009).

The search strategies for each database are reported in Appendix 1.

Searching other resources

We searched reference lists from relevant studies to identify potentially relevant trials.

Data collection and analysis

Four review authors, in pairs, independently conducted database searches. Two review authors (JV, ML) conducted searches for the CENTRAL, CINAHL and PsycINFO databases. NM and ES conducted searches for MEDLINE, EMBASE and PEDro. NM collected and combined the search results for the selection of studies.

Selection of studies

Two review authors (JV, ML) independently screened titles and abstracts of the potentially relevant studies found in the CENTRAL, CINAHL and PsycINFO databases. NM and ES independently screened titles and abstracts of studies found in MEDLINE, EMBASE and PEDro. We developed a standardised form for the inclusion criteria to assist authors. The inclusion criteria (Appendix 2) consisted of type of study, interventions and outcome measures. We excluded studies that did not meet the relevant inclusion criteria and documented the reasons for exclusion in the table of Characteristics of excluded studies. Any disagreement on the eligibility of a trial was discussed until consensus was reached. Following this process, we obtained the full text of all articles that potentially qualified for inclusion.

Data extraction and management

We developed a standardised data extraction form and pilot tested the form on a sample of studies to ensure it was understandable, easy to complete and comprehensive. Two review authors (NM, ES) independently extracted data based on the methods, participants, interventions, outcomes and main results of each study and compared completed forms to verify agreement. Disagreements were resolved by discussion, until consensus was reached. We contacted study authors for more information when there was insufficient information in the study reports.

Assessment of risk of bias in included studies

In order to reduce the potential for bias, we used the checklist developed by Downs 1998 to measure the included study's quality. The checklist included 13 items for internal validity (seven items for bias and six items for confounding), 10 items for reporting and three items for external validity. We reported the internal validity items in the 'Risk of bias' table in the table of Characteristics of included studies and the external validity and reporting quality items in Table 1. We scored and ranked the studies according to scales of 'yes', 'no' and 'unable to determine'. Two review authors (NM, ES) conducted the assessments independently and all disagreements were resolved by discussion.

Table 1. Reporting and external validity

Study design		**RCT**
Study ID		**Gross (2007)**
Reporting		
1	Is the hypothesis/aim/objective of the study clearly described?	1
2	Are the main outcomes to be measured clearly described in the Introduction or the Methods section?	1
3	Are the characteristics of the participants included in the study clearly described?	1
4	Are the interventions of interest clearly described? (aims, content, ...)	1
5	Is the distribution of confounders in each group of subjects to be compared clearly described? (working condition, health status...)	1
6	Are the main findings of the study clearly described?	1
7	Does the study provide estimates of the random variability in the data for the main outcomes?	1
8	Have any adverse events that may be a consequence of the intervention been reported?	1
9	Have the characteristics of participants lost to follow up been described?	1
10	Have actual probability values been reported for main outcomes instead of discreet values (e.g. 0.035 instead of < 0.05), except when less than 0.001?	1

Table 1. Reporting and external validity (*Continued*)

External validity		
11	Were the subjects asked to participate in the study representative of the entire population from which they were recruited?	1
12	Were those subjects who were prepared to participate representative of the entire population from which they were recruited?	1
13	Were the staff, places and facilities where the participants were treated representative of the treatment the majority of workers would receive?	1
	TOTAL	**13/13**

Grading the strength of evidence

We assessed the strength of evidence by the GRADE approach (GRADE Working Group 2004).

Measures of treatment effect

We plotted the hazard ratios with their 95% confidence intervals as the effects of treatment in the data tables in Review Manager using the inverse variance method (Higgins 2008).

Unit of analysis issues

We intended to adjust for the cluster effect in cluster-randomised trials that had not done so in their analysis, but as we only found one study with a non-significant outcome we felt this was not necessary.

Dealing with missing data

We contacted the authors if data on the outcome or risk of bias were missing (Gross 2007).

Data synthesis

We would have pooled studies with sufficient data, judged to be clinically homogeneous, with Review Manager 5 software. When pooling data from medical, psychological and physical tests, we would have made sure we only pooled similar tests in our analysis. If studies were statistically heterogeneous, we would have used a random-effects model, otherwise we would have used a fixed-effect model. For the analysis of hazard ratios, we would have used the inverse variance method.

Sensitivity analysis

We planned to analyse the studies by high versus low quality.

RESULTS

Description of studies

See: Characteristics of included studies; Characteristics of excluded studies.

Results of the search

The initial search of the databases yielded 3340 seemingly relevant studies; 124 in CENTRAL, 233 in CINAHL, 2293 in EMBASE, 516 in MEDLINE, 159 in PEDro and 15 in PsycINFO. Once the 659 duplicates had been removed, a list of 2681 articles remained. From these, independent screening by four authors (NM, ES, JV, ML) using keywords, titles and abstracts identified 70 potentially suitable articles of which the full texts were obtained. Screening of each full-text article according to the above criteria resulted in the inclusion of one study that fulfilled the inclusion criteria (Gross 2007).

Included studies

One randomised controlled trial involving 372 claimants undergoing FCE at the Workers' Compensation Board of Alberta rehabilitation facility (from 2004 to 2005) is included in this review. Clinicians experienced in FCE (N = 23) were randomised to either short-form or long-form FCE. The study compared the recurrence of injuries following the short-form FCE compared to the standard long-form FCE (Isernhagen Work Systems). The short-form FCE developed by Gross 2006b consists of items selected from Isernhagen Work Systems and Ruan 2001's Functional Assessment Screening Test. It provides separate region-specific protocols for measuring the physical functioning of the individual's trunk, upper extremities and lower extremities, whereby the appropriate items can be selected for a single region or, where multiple injury sites are indicated, combined to assess multiple regions, according to the participant's diagnosis. While assessors may add new items as deemed necessary, evaluation only takes four hours. In contrast, the longer standard FCE protocol includes evaluation of the worker's capacity for dynamic lifting, carrying, pushing and pulling, overhead work and walking, takes about five hours and is usually done over two days. The worker's performance observed during the assessment is compared to his/her specific physical job demands based on which a decision regarding their fitness-to-work is made.

The recurrence rates of sickness absence were measured over the period of one year following short-form or standard FCE. Recurrences refer to whether the claim was re-opened or a new claim filed after initial claim closure or whether time-loss benefits restarted after having been suspended from the period of seven days within one year after FCE. The outcome measures were evaluated in three ways:

1. recurrences of injury claim after initial benefit suspension or claim closure;
2. re-starting benefit payments after initial suspension of benefit; and
3. re-opening claims or filing a new claim after claim closure.

Excluded studies

Of the studies that were excluded after examination of the full text, we rejected eight because their designs did not fulfil our inclusion criteria (Gross 2004a; Gross 2004b; Gross 2005; Kuijer 2006; Gross 2006; Lechner 2008; Gouttebarge 2009; Streibelt 2009).

Risk of bias in included studies

We assessed the included study for risk of bias according to the Downs 1998 checklist. We contacted the author for additional information whereupon four items initially scored as 'unable to determine' and 'no' were changed to 'yes'.

Internal validity: bias and confounding

The study's internal validity results are presented in the 'Risk of bias' table in the Characteristics of included studies table. From these items, the internal validity quality rating is 12/13. The study reported blinding participants from the intervention they received but the therapists were aware of which form of FCE they were conducting.

Reporting and external validity

The reporting quality was rated 10/10 and the external validity quality achieved a score of 3/3 (Table 1).

Effects of interventions

Short-form functional capacity evaluation (FCE) versus standard FCE

Recurrence rates

There was no difference in recurrence rates of re-injuries in the year following short-form FCE or standard FCE expressed in:

1. all recurrences after initial benefit suspension or claim closure (hazard ratio (HR) 1.25, 95% CI 0.79 to 1.98);
2. re-starting benefits after initial suspension (HR 1.40, 95% CI 0.66 to 2.95); and
3. re-opening or filing of a new claim after initial closure of claims for the same incident (HR 1.17, 95% CI 0.72 to 1.91).

The single significant difference between the two interventions was in terms of the time required to perform the functional assessment: short-form FCE was reported to take 43% less time than standard FCE.

DISCUSSION

Summary of main results

This review found no studies that compared functional capacity evaluation (FCE) versus no intervention. We found low quality evidence based on one study that short-form FCE resulted in similar recurrence rates of sickness absence of injured workers compared to standard FCE.

Overall completeness and applicability of evidence

The single study included in the review only compared two variants of one FCE method. While the results of this comparison would suggest that there is only a time-cost benefit to be gained from conducting short-form FCE as opposed to standard FCE, no evidence was found on the effectiveness of either form in predicting injury recurrence. A more appropriate way to conduct a randomised controlled trial on this topic would be to compare the recurrence following FCE to recurrence after recommendations made by health professionals (medical or allied health) without the use of an FCE.

Quality of the evidence

Since only one randomised controlled study could be reviewed, the findings are regarded as low quality evidence.

Potential biases in the review process

A number of factors contributed to ensuring that any potential bias in the reviewing process was kept to a minimum. Given that we conducted a thorough search of the named databases and screened all lists of references for potential studies, it is unlikely that any studies were missed that would have met the inclusion criteria. There was no language restriction in the search strategy since all non-English abstracts were translated to determine their suitability for further investigation and possible inclusion. As stated previously, the inclusion criteria themselves were rigorously observed through comparison of any potential study against the predefined checklist.

AUTHORS' CONCLUSIONS

Implications for practice

We found low quality evidence from one trial that short and long forms of functional capacity evaluation (FCE) result in similar recurrence rates of sickness absence while the short form led to a 43% reduction of time to perform the assessment.

Implications for research

The effectiveness of FCE-based recommendations should be investigated in randomised controlled trials compared to no FCE or alternative recommendations. The rate of or time to recurrence should be used as the primary outcome measure.

ACKNOWLEDGEMENTS

Dawn Payoe from the Health Sciences Library, University of Sydney, provided assistance in the development of the search strategy.

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Gross DP, Battie MC. Does functional capacity evaluation predict recovery in workers' compensation claimants with upper extremity disorders?. *Occupational and Environmental Medicine* 2006;**63**(6): 404–10.

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* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

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

Gross 2007

Methods	Cluster-randomised controlled trial
Participants	372 claimants (173 for intervention and 199 for control) who were undergoing assessment from the Workers' Compensation Board of Alberta between October 2004 and May 2005 and who were non-systematically assigned to intervention and control group
Interventions	Intervention: a 4-hour short-form FCE developed by Gross et al. (2006) comprising selected items from Isernhagen's Work Systems FCE and Ruan et al's (2001) Functional Screening Test, providing separate region-specific protocols for assessments of the trunk, upper extremities and lower extremities according to claimants' diagnoses Control: standard Isernhagen Work Systems FCE involving a more thorough two-day physical assessment
Outcomes	Recurrence of sickness absence, based on 1) all recurrences after initial benefit suspension or claim closure, 2) restarting benefits after initial suspension and 3) re-opening or filing of a new claim after initial closure
Notes	-

Risk of bias

Item	Authors' judgement	Description
Blinding of study subjects?	Yes	Claimants were blinded from the study and did not know the kind of assessment they received
Blinding of outcome assessor?	Yes	Data on readiness to return to work were assessed from claims information from WCB-Alberta administrative databases
Results based on "data dredging"?	Yes	No retrospective unplanned subgroup analyses were reported
Analyses adjust for different lengths of follow up of workers?	Yes	Analyses were conducted on 12-month follow up only
Appropriate statistical test use?	Yes	Independent samples t-test, Cox and logistic regression
Compliance with recommendation reliable?	Yes	Therapists from the intervention and control groups assessed claimants' physical ability according to the prescribed assessment

Gross 2007 (*Continued*)

Outcome measures used valid and reliable?	Yes	Recurrence of sickness absence is based on 1) all recurrences after initial benefit suspension or claim closure, 2) restarting benefits after initial suspension and 3) re-opening or filing of a new claim after initial closure
Recruitments of participants from the same population?	Yes	Participants for the intervention groups and control group were recruited from the same population; all claimants underwent assessment from October 2004 through to May 2005
Recruitments of participants over the same time period?	Yes	Claimants from both groups were recruited between October 2004 through May 2005
Subjects randomised to intervention groups?	Yes	Cluster-randomisation at the therapist level using a random number generator
Adequate adjustment for confounding in the analyses?	Yes	More information was obtained on the potential confounders within the compensation databases that might influence future recovery such as age, gender, previous claims, employment status, pre-accident annual salary, scores on the Pain Disability Index and visual analogue pain scale
Losses to follow up taken into account?	Yes	There was no loss to follow up
Randomised intervention assignment concealed?	No	The therapists were obviously aware of which form of FCE they were conducting

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

Study	Reason for exclusion
Gouttebarge 2009	No control group
Gross 2004a	Historical cohort study
Gross 2004b	Historical cohort study
Gross 2005	Prospective study design
Gross 2006	No control group
Kuijer 2006	Explorative prognostic cohort study design

(*Continued*)

Lechner 2008	No control group
Streibelt 2009	No control group

DATA AND ANALYSES

Comparison 1. Short-form FCE versus standard FCE

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 All injury recurrences after initial benefit suspension or claim closure	1		Hazard Ratio (Fixed, 95% CI)	Subtotals only
2 Restarting benefits after initial suspension	1		Hazard Ratio (Fixed, 95% CI)	Subtotals only
3 Claims re-open or new claim filing after initial closure	1		Hazard Ratio (Fixed, 95% CI)	Subtotals only

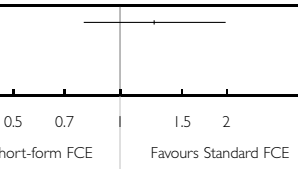
Analysis 1.1. Comparison 1 Short-form FCE versus standard FCE, Outcome 1 All injury recurrences after initial benefit suspension or claim closure.

Review: Functional capacity evaluations for the prevention of occupational re-injuries in injured workers

Comparison: 1 Short-form FCE versus standard FCE

Outcome: 1 All injury recurrences after initial benefit suspension or claim closure

Study or subgroup	Short-form FCE N	Standard FCE (IWS) N	log [Hazard Ratio] (SE)	Hazard Ratio IV,Fixed,95% CI	Hazard Ratio IV,Fixed,95% CI
Gross 2007	173	199	0.2231 (0.2344)		1.25 [0.79, 1.98]



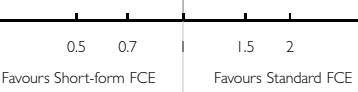
Analysis 1.2. Comparison 1 Short-form FCE versus standard FCE, Outcome 2 Restarting benefits after initial suspension.

Review: Functional capacity evaluations for the prevention of occupational re-injuries in injured workers

Comparison: 1 Short-form FCE versus standard FCE

Outcome: 2 Restarting benefits after initial suspension

Study or subgroup	Short-form FCE N	Standard FCE N	log [Hazard Ratio] (SE)	Hazard Ratio IV,Fixed,95% CI	Hazard Ratio IV,Fixed,95% CI
Gross 2007	173	199	0.3365 (0.381)		1.40 [0.66, 2.95]



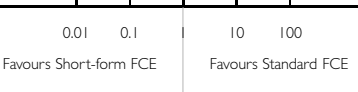
Analysis 1.3. Comparison 1 Short-form FCE versus standard FCE, Outcome 3 Claims re-open or new claim filing after initial closure.

Review: Functional capacity evaluations for the prevention of occupational re-injuries in injured workers

Comparison: 1 Short-form FCE versus standard FCE

Outcome: 3 Claims re-open or new claim filing after initial closure

Study or subgroup	Short-form FCE N	Standard FCE N	log [Hazard Ratio] (SE)	Hazard Ratio IV,Fixed,95% CI	Hazard Ratio IV,Fixed,95% CI
Gross 2007	173	199	0.157 (0.2502)		1.17 [0.72, 1.91]



APPENDICES

Appendix 1. Search strategy

Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library 2009, Issue 4)

#1.(functional capacity evaluation or functional capacity evaluations).mp.
#2.(FCE or FCEs or FCEJs or FCENJs).mp.
#3.functional capacity.mp.
#4.functional assessment.mp.
#5.exp disability evaluation
#6.or/#1-#5
#7.return to work.mp.
#8.absenteeism.mp. or exp Absenteeism/
#9.sick leave.mp. or exp Sick Leave/
#10.or/#7-#8
#11.#6 and #10

MEDLINE (1966 to December 2009)

1. RANDOMIZED CONTROLLED TRIAL. pt.
2. CONTROLLED CLINICAL TRIAL. pt.
3. RANDOMIZED CONTROLLED TRIALS as topic.mp.
4. RANDOM ALLOCATION. sh.
5. DOUBLE BLIND METHOD. sh.
6. SINGLE BLIND METHOD. sh.
7. or/1-6
8. (ANIMALS not HUMANS).sh.
9. 7 not 8
10. CLINICAL TRIAL. pt.
11. CLINICAL TRIALS as topic.mp.
12. (clin$ adj 25 trial$).ti,ab.
13. ((singl$ or doubl$ or trebl$ or tripl$) adj6 (blind$ or mask$)).ti,ab.
14. PLACEBOS.sh.
15. PLACEBO$.ti,ab.
16. random$.ti,ab.
17. research design.sh.
18. or/10-17
19. 18 not 8
20. 19 not 9
21. comparative study.sh.
22. exp evaluation studies/
23. follow up studies.sh.
24. prospective studies.sh.
25. (control$ or perspectiv$ or volunteer$).ti,ab.
26. or/21-25
27. 26 not 8
28. 27 not (9 or 20)
29. 9 or 20 or 28
30. (functional capacity evaluation or functional capacity evaluations).mp.
31. functional capacity.mp.
32. (FCE or FCEs or FCEJs or FCENJs).mp.

33. functional capacity assess$.mp.
34. functional assess$.mp.
35. disability evaluation/or work capacity evaluation/
36. or/30-35
37. (return to work or return-to-work).mp.
38. sick leave/ or Absenteeism/ or sickness absence.mp.
39. or/37-38
40. 36 and 39
41. 29 and 40

EMBASE (1980 to December 2009)

((((’controlled study’/exp OR ’controlled study’:ti,ab,de,df,dn,mn,tn) OR (’statistical analysis’/exp OR ’statistical analysis’:ti,ab,de,df,dn,mn,tn) OR (’major clinical study’/exp OR ’major clinical study’:ti,ab,de,df,dn,mn,tn) OR ((’randomized controlled trial’/exp) OR ’randomized controlled study’:ti,ab,de,df,dn,mn,tn) OR (random$:ti,ab,de,df,dn,mn,tn) OR (’double blind procedure’/exp OR ’double blind procedure’:ti,ab,de,df,dn,mn,tn) OR (’single blind procedure’/exp OR ’single blind procedure’:ti,ab,de,df,dn,mn,tn) OR (’multicenter study’/exp OR ’multicenter study’:ti,ab,de,df,dn,mn,tn)) AND (’human’/exp)) NOT (’animal’/exp)) AND ((’functional capacity evaluation’:ab,ti,de) OR (’fce’:ab,ti,de) OR (’fces’:ab,ti,de) OR (’fcejs’:ab,ti,de) OR (’fcenjs’:ab,ti,de) OR (’functional capacity assessment’:ab,ti,de) OR (’return-to-work’:ab,ti,de) OR (’absenteeism’/exp) OR (’medical leave’/exp) OR (’sick leave’:ab,ti,de) OR (’sickness absence’:ab,ti,de))

CINAHL (1980 to December 2009)

1. functional capacity evaluation
2. FCE
3. functional capacity assessment.mp
4. exp disability evaluation/
5. or /1-4
6. exp job-re-entry
7. return to work.tw
8. exp sick leave/
9. exp absenteeism/
10. or/ 6-9
11. 5 and 10

PsycINFO (1983 to December 2009)

1. (functional capacity evaluation or functional capacity evaluations).mp.
2. (FCE or FCEs or FCEJs or FCENJs).mp.
3. functional capacity$.mp.
4. exp Disability Evaluation/
5. or/1-4
6. exp Reemployment/
7. return to work.mp.
8. exp Employee Leave Benefits/
9. (sick leave or absenteeism).mp.
10. exp Employee Absenteeism/
11. or/6-10
12. 5 and 11

PEDro (1929 to December 2009)

functional capacity evaluation or functional capacity assessment or work capacity evaluation (in the 'abstract and title' field), and ergonomics and occupational health and musculoskeletal (in the sub discipline field).

Appendix 2. Inclusion criteria for functional capacity evaluation

Inclusion criteria for functional capacity evaluation		
Article: **Reviewer:**		
Type of studies	**Yes**	**No**
1) Randomised controlled trial (any type of control group accepted)		
2) Clinical controlled trial (any type of control group accepted)		
3) Prospective cohort study (controlled before-after) (any type of control group accepted)		
4) Interrupted time series (3 time points before and 3 time points after the intervention)		
Interventions	**Yes**	**No**
5) FCE if the capacity of the worker to meet the physical requirements for the job are measured (e.g. job requires 20 kg to be lifted, the FCE then measures if the worker can lift the 20 kg)		
Outcomes	**Yes**	**No**
6) Occupational disease as stated by the authors of original article		
7) Occupational injuries as stated by authors of original article		
8) Time to return to work following injury or disease report		

(*Continued*)

9) Work status (at work/off work) at follow up		
10) Sick days		
Include if: (1 or 2 or 3 or 4) AND (5) AND (6 and/or 7 and/or 8 and/or 9 and/or 10)	**INCLUDE**	**EXCLUDE**

Appendix 3. GRADE criteria

According to GRADE:

- Limitations of study refer to the lack of allocation concealment and blinding, incomplete accounting of patients and outcome events, selective outcome reporting and other limitations (e.g. stopping early for benefit observed in randomised trials, use of invalidated patient-reported outcomes, carry-over effects etc).
- Inconsistency refers to unexplained heterogeneity of results.
- Indirectness refers to the clarity and explicitness of evidence tables, depending on the target population, intervention and outcomes of interest to help authors of systematic review to answer a healthcare question.
- Imprecision refers to the results of studies which include relatively few patients and few events and consequently have wide confidence intervals around the estimate of the effect.
- Publication bias refers to the systematic underestimate and overestimate of the underlying beneficial and harmful effect due to the selective publication of studies.

HISTORY

Protocol first published: Issue 3, 2008

Review first published: Issue 7, 2010

CONTRIBUTIONS OF AUTHORS

NM and ES conducted the study selection, quality assessment, data extraction and data analysis, and drafted the review.

JV and ML conducted the study selection and data analysis, and commented on the review.

ES, JV, MFR, JBF and FS commented on the review.

DECLARATIONS OF INTEREST

None known.

SOURCES OF SUPPORT

Internal sources

- No sources of support supplied

External sources

- Finnish Institute of Occupational Health, Finland.

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

The differences between the protocol and review are as follows:

1. We changed the definition of functional capacity evaluation (FCE) to "evaluation of capacity of activities that is used to make recommendations for participation in work while considering the person's body functions and structures, environmental factor, personal factors and health status" (Soer 2008 page 394).

2. We have added the word "FCE-based" and "re-" injuries in the Objectives. The new objective is to assess the effectiveness of FCE-based return to work recommendations in preventing occupational re-injuries of injured workers compared with no intervention or alternative interventions.

3. Methods for study selection and extraction differ from the original protocol in their descriptions of who performed them and how disagreement was dealt with.

4. In the protocol, outcome measures were mentioned such as incidence of musculoskeletal disorders or diseases and work status (at work or off work) at follow up.

5. We changed the definition of readiness to return to work to recurrence of sickness absence based on the time of receiving time-loss benefits and the duration of claims.

6. We have graded quality of evidence according to the GRADE criteria.

INDEX TERMS

Medical Subject Headings (MeSH)

*Work Capacity Evaluation; Absenteeism; Recurrence [prevention & control]; Wounds and Injuries [*prevention & control]

MeSH check words

Humans