Review

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Effectiveness of a return-to-work intervention for subacute low-back pain

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The effectiveness of return-to-work intervention for subacute low-back pain on work absenteeism, pain severity, and functional status was examined by means of a systematic review of randomized controlled trials. Publications in English that met the selection criteria were identified in a computer-aided search and assessed for methodological quality. A best-evidence synthesis was performed instead of statistical data pooling, because of the heterogeneity of the interventions and study populations. Five of nine studies comparing return-to-work intervention with usual care were identified as methodologically high-quality studies. Strong evidence was found for the effectiveness of return to work intervention on the return-to-work rate after 6 months and for the effectiveness of return-to-work intervention on the reduction of days of absence from work after ≥12 months. It can be concluded that return-to-work interventions are equal or more effective regarding absence from work due to subacute low-back pain than usual care is.

Key terms back injury; behavioral treatment; ergonomic measures; health education; occupational health care; physical exercises; rehabilitation; pain severity; review; work absenteeism.

Low-back pain is a major medical and social problem that causes both individual physical and psychological distress and great expense to society in industrialized western countries (1–4). It is one of the frequent occurring reasons for temporal or permanent disability to work, and it is also associated with a loss of productivity (4, 5). In The Netherlands, 93% of the costs of low-back pain are estimated to be attributable to nonmedical, indirect costs, particularly due to work absenteeism and disability benefits (4).

In approximately 95% of all cases of occupational low-back pain, there is no specific anatomical or pathophysiological explanation for the complaints (6, 7). This nonspecific low-back pain is viewed as a benign self-limiting disorder that usually resolves spontaneously within a few weeks. Some of the cases of low-back pain may experience relapses, however, and develop a chronic low-back-pain syndrome. (8, 9)

Intervention after the onset of low-back pain and work absenteeism is a practical alternative for primary prevention. Such therapeutic intervention is intended to prevent subacute low-back pain from becoming chronic with a long-lasting disability to work (5, 10, 11). Return to one's regular work without relapses is the ultimate goal of this type of intervention (11). Such intervention for low-back pain is often designed as a therapeutic program intended to improve physical functioning and, subsequently, to enhance return to work. The return to work is seen by some researchers as a misleading indicator of the effectiveness of health care intervention, because return to work does not necessarily correlate with the health status of the worker (10). However, it can be argued that, from the occupational health care perspective, return to work should be considered an important primary outcome measure.

Our systematic review explores the scientific evidence of available randomized controlled trials on the effectiveness of return to work intervention with respect to subacute low-back pain, in comparison with usual care, with regard to absenteeism from work, functional status, and pain.

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Methods

Search strategy used to identify the randomized controlled trials

Randomized controlled trials published in English were identified by computer-aided searches in Medline, PsycINFO, Embase, and the Cochrane Controlled Trials Register. All the searches were performed from the date of availability of the databases until February 2004. A reference check for relevant publications was carried out to complete the search.

The following keywords were used for the search: randomized (randomised) controlled trial, controlled clinical trial, random allocation, double blind method, single blind method, occupational therapy, rehabilitation, rehabilitation centers, experimental treatment outcome, experimental behavior therapy, recovery, back pain, low-back pain, backache, sciatica, back injury, sick leave, sick days, disability leave, employment status, disability evaluation, workers' compensation.

Criteria used to select the studies for review

Two reviewers (HH and MS) independently selected publications to be included in this systematic review, using the following inclusion and exclusion criteria: (i) type of study—only randomized controlled trials were included; (ii) type of intervention—all studies evaluating any type of out-patient intervention for sick-listed workers with low-back pain and aimed at return to work were included (one of the reference groups should receive traditional or usual care treatment, eg, by a general practitioner or other care providers; if applicable, the reference group should receive no treatment at all); (iii) type of population—the participants should be adult workers who were absent from paid work due to subacute, nonspecific low-back pain, with or without referral to the leg [studies evaluating surgical or pregnant persons were excluded; the subacute period was defined as a period of low-back pain complaints for at least 4 weeks, but no more than 3 months (5)]; (iv) type of outcome measures—work status should be one of the main outcome measures (functional status and pain could have been used as additional outcome measures).

Methodological quality assessment

The methodological quality was scored according to a list of 11 criteria based on the guidelines for methodological quality assessment, as proposed by the Cochrane Collaboration Back Review Group (12). The methodological criteria list and their specifications are presented in the appendix.

An item was rated positive (+) when the information in the publication provided sufficient proof for fulfilling the criterion. An item was rated negative (–) in case of sufficient information about not fulfilling the criterion, or in case of lacking any information about the item. An item was rated unclear (?) in case of an unclear interpretation.

Two reviewers (HH and MS) independently rated the methodological quality of the randomized controlled trials according the list in the appendix. One study was rated by a third independent reviewer (GA) in order to prevent conflict of interest, because one of the reviewers (HH) was one of the investigators in this study (13). The differences in judgment were discussed, and disagreements were solved between the reviewers. In case of persistent disagreement a fourth independent assessor (JBS) was consulted and asked to make a final judgment. The initial interobserver reliability of the methodological quality assessment was evaluated by means of Cohen's kappa test.

Data extraction and analysis

If available, the following outcome measures were extracted for the follow-up periods of 6 months, 12 months, or for a longer follow-up period: work absenteeism, expressed as the number of days of sick leave or as the return-to-work rate (percentage of workers who returned to work by the end of a follow-up period); pain intensity; and functional status. When no exact data were reported, the values were approximated from the graphs or other statistics in the publication. Missing standard deviations of the outcomes were requested from the author of the publication or were replaced by the standard deviation of the baseline value.

Effect sizes were calculated for the available outcome measures and follow-up periods using the MetaView option of Review Manager software (RevMan version 4.2.3). The calculated effect sizes were expressed for dichotomous data as a risk difference (RD) with corresponding 95% confidence intervals (95% CI) and for continuous data as the standardized mean difference (SMD), also with corresponding 95% CI values.

The best evidence synthesis

In this review, we considered a randomized controlled trial with a score of ≥5 out of 9 possible points as a study of high methodological quality. Two of the eleven original items (ie, blinding of the patients and blinding of the intervention providers) were excluded post-hoc. These two items were scored negative in all the studies, and they are, in our opinion, not suitable for the rating of the methodological quality of this type of study, because it is not possible in this type of low-back pain study to blind the therapy provider or the patient for type of treatment.

The effect sizes were not pooled into a meta-analysis because of the heterogeneity of the content of the interventions, study populations, and study settings. Instead of it, a qualitative rating system was applied to summarize scientific evidence of the randomized controlled trials (12). The rating system was based on the methodological quality of the study and on the outcome of the study. The outcomes of the studies were considered consistent if ≥75% of the trials reported statistically significant results in the same direction. The following four levels of evidence were distinguished: (i) strong evidence, consistent findings among multiple high-quality randomized controlled trials; (ii) moderate evidence, consistent findings among multiple low-quality randomized controlled trials or one high-quality randomized controlled trial, (iii) limited evidence, one low-quality randomized controlled trial; (iv) conflicting evidence, inconsistent findings among multiple randomized controlled trials; (v) no evidence, no randomized controlled trials available.

Clinical relevance

The clinical relevance of the studies was assessed by the reviewers answering the following five questions: (i) are the patients described and comparable with those in one's own practice, (ii) are the interventions and treatment settings described well enough so that the clinician can provide the same treatment for his or her own patients, (iii) were all clinically relevant outcomes measured and reported, (iv) is the size of the effect clinically important, and (v) are the likely treatment benefits worth the potential harm?

Results

Database search

The database searches identified a total of 1087 references. Reading the title and abstract, excluding references which were found in more than one database, and detailedly reading the selected papers and screening their references resulted in the inclusion of nine studies that met the inclusion criteria of this review (13–21). Four studies were described in more than one publication covering different follow-up periods (13, 15, 17, 19, 22–25). The basic characteristics of the selected studies are described in table 1.

Study characteristics

Among the nine studies included, two basic therapeutic modalities were used in all the interventions (ie, physical exercise or advice about it and education). These two modalities were supplemented with behavioral treatment in six studies (13, 14, 16, 18, 19, 21), with ergonomic measures in another two studies (16, 19), and with case management in six studies (13, 14, 16, 18–20). All the studies compared return-to-work intervention to either usual care provided by a general practitioner or other care provider or to no therapy at all.

In two studies the duration of the entire intervention was restricted to <5 hours altogether (15, 17). One study evaluated the effect of a coordinated primary health care program consisting of a single clinical consult and an education session followed by weekly phone contacts with the participants (20). In the remaining six studies, the intervention varied from two or three sessions a week (13, 18, 21) to almost a full-time intervention for several weeks (14, 16, 19).

In most of the studies, no information was given about the duration of the episodes of low-back pain prior to the period of work absenteeism. Preintervention work absenteeism varied from 4 to 8 weeks. The follow-up period of the included randomized controlled trials varied from 18 weeks to >6 years. Two studies investigated a follow-up period of <6 months (20, 21); all the other studies described a follow-up of at least 6 months or longer.

Methodological quality of the studies

Table 2 summarizes the results of the methodological quality score of the included studies.

In general, the methodological quality of the randomized controlled trials in this review was moderate, with a mean score of 4.7 points out of a range from 0 through 9 points. Five of the nine studies obtained more than 50% of the possible score, and these studies were considered high in quality (13–15, 20, 21). Information about co-interventions and compliance with the treatment was not reported in most of the randomized controlled trials. Almost all of the trials assessed the outcome measures for all the study groups at the same time and applied analyses according to the intention-to-treat principle.

The initial interobserver reliability of the methodological quality scores showed substantial agreement (kappa = 0.78) (26).

Effectiveness of the return-to-work interventions for subacute low-back pain

We identified nine randomized controlled trials that compared return-to-work intervention with usual care. Figure 1 presents an overview of the effect on the return-to-work rate, days of work absenteeism, functional status, and severity of pain complaints for different follow-up times.

Table 1. Characteristics of studies included in the review. (Studies listed in alphabetical order)

Reference	Number	Case definition	Work absence	Duration of follow-up	Description of the intervention	Outcome measures
Gatchel et al, 2003 (14)	22 in high-risk early intervention group; 48 in high-risk nonintervention group; 54 in low-risk nonintervention group	Low-back pain	Less than 2 months	3 and 12 months	Early intervention group received a functional restoration program with an interdisciplinary team approach consisting of 4 major components: psychology, physical therapy, occupational therapy, and case management. 5 different sessions each administrated 9 times, examination and interdisciplinary conferences were spaced over a 3-week period; high risk and low risk nonintervention group did not receive any early intervention.	Days of absence from work; pain
Hagen et al, 2000 (15); Hagen et al, 2003 (22)	237 in intervention group; in 220 control group	Low-back pain and sciatica	8–12 weeks	3, 6, 12 and 36 months	Intervention group was examined at a spine clinic (patients were informed about the good prognosis of low-back pain, they were advised to remain physically active, and they received instructions on how to train and stretch at home. The visit at the spine clinic lasted 3 hours; the control group received no examinations at a spine clinic; the patients were treated within conventional primary health care.	Return-to-work rate; days of absence from work
Haldorsen, et al, 1998 (16)	142 in intervention group; 81 in control group	Low-back pain and sciatica	8 weeks	12 months	Intervention group received multimodal cognitive behavioral treatment, lasting 4 weeks, with 6-hour sessions, 5 days/week, given by a physician, physiotherapists, a psychologist, and a nurse (job modifications were discussed with the health services and the employer, and if necessary a re-education in an alternative job was arranged); control group patients were followed and treated by general practitioner and particularly by physiotherapist.	Return-to-work rate; pain
Indahl et al, 1995 (17) (a); Indahl et al, 1998 (23) (b) [a]	512 in intervention group a and 245 in intervention group b; 463 in control group a and 244 in control group b	Low-back pain and sciatica	8–12 weeks	3 and 12 months in study a; 5 years in study b	Intervention group received a light mobilization program. Patients were examined by a physician and were tested for functional capacity, health and psychological factors. They were educated about the causes of low-back pain, the relation between emotions and increase of pain and good prognosis of low-back pain. They were given guidelines on lifting and how to deal with muscle spasm. The information was given at starting point and reinforced after 3 &12 months. Control group was not called in for examination. Patients were treated within the conventional medical system.	Return-to-work rate
Lindström et al, 1992 (18)	51 in intervention group; 52 in control group	Low-back pain	6 weeks	12 and 24 months	Intervention group received traditional care plus a graded activity program consisting of (i) measurements of functional capacity; (ii) workplace visit; (iii) Swedish back school; (iv) individual, submaximal, gradually increased exercise program aimed to return to regular unmodified work. Control group was treated within traditional care recommended by home physicians.	Return-to-work rate; days of work absence; pain; functional status
Loisel et al, 1997 (19); Loisel et al, 2002 (24)	31 in clinical intervention; 22 in occupational intervention; 25 in full intervention; 26 in usual care	Thoracic or lumbar back pain	4 weeks to 3 months	12 months and 6.4 years	Occupational intervention included workers' visits to occupational physician and a participatory ergonomics evaluation by an ergonomist after 6 weeks of absence from work. Clinical intervention was implemented after 8 weeks' absence from work and consisted of a visit to a back-pain specialist and a "back care school" for 1 hour/day during 4 weeks. If return to work did not occur after the back school, a multidisciplinary work rehabilitation therapy was proposed. Full intervention was a combination of both interventions. The usual care group received any treatment prescribed by attending physician.	Return-to-work rate; days of work absence; pain; functional status
Rossignol et al, 2000 (20)	54 in intervention group; 56 in control group	Work related injury to thoracic, lumbar or sacral vertebral column	4–8 weeks	3 and 6 months	Intervention group received a program for "coordination of primary health care" for low-back pain, which included a complete examination, recommendations for clinical management, and support to carry out the recommendations. The coordinating nurse called the worker weekly until return to work. The control group received usual care.	Return-to-work rate; functional status; pain
Staal et al, 2004 (13); Staal, 2003 (25)	67 in graded activity group; 67 in usual care group	Nonspecific low-back pain	Low-back pain for at least 4 weeks; sick listed at inclusion	6 and 12 months	Besides the usual guidance from the occupational physician, the intervention group received a graded activity intervention, supervised by the physiotherapist, with frequency of 2 1-hour sessions per week, until full return to regular work. The intervention had a maximal duration of 3 months. The usual care group received usual guidance and advice from the occupational physician. General practitioners were requested to treat the participants according to the their low-back pain guidelines.	Days of absence from work; pain; functional status
Storheim et al, 2003 (21)	30 in exercise group; 34 in cognitive intervention; 29 in control group	Low-back pain	8–12 weeks	18 weeks	Both intervention groups underwent a routine back examination, explanation of X-rays and CT scans, and general encouragement to resume daily activities and work. Cognitive group received 2 consultations, each lasting between 30 and 60 minutes with an explanation of pain mechanisms, education on muscle function, on lifting technique and how to cope with new attacks. The exercise group received a modification of the Norwegian aerobic fitness model, focused on the low-back pain patient. The exercise period was 15 weeks with a minimum of bi-weekly exercise sessions each for 1 hour, preferably 3 sessions/week. The patients in the control group were treated by their general practitioner and had no restrictions as to treatments or referrals.	Days of absence from work; pain; functional status

[a] Study b is a 5-year follow-up of a part of the subjects from study a.

Table 2. Assessment of methodological quality of nine randomized controlled trials with return-to-work intervention for subacute low-back pain. (+ = sufficient proof of fulfilling criterion, – = sufficient information about not fulfilling crierion, ? = interpretation unclear)

Reference	Adequate randomization	Treatment allocation	Baseline similarity	Blinding assessor	Co-intervention	Compliance	Drop-out rate	Timing assessments	Intention to treat	Total score
Gatchel et al, 2003 (14)	+	?	-	+	?	?	+	+	+	5
Hagen et al, 2000 (15); Hagen et al, 2003 (22)	+	+	+	?	?	?	+	+	+	6
Haldorsen et al, 1998 (16)	-	?	?	+	?	?	-	+	+	3
Indahl et al, 1995 (17); Indahl et al, 1998 (23)	-	-	?	?	?	?	+	+	-	2
Lindström et al, 1992 (18)	?	?	?	?	?	?	+	+	+	3
Loisel et al, 1997 (19); Loisel et al, 2002 (24)	+	?	-	+	?	?	+	+	-	4
Rossignol et al, 2000 (20)	+	?	-	+	+	?	-	+	+	5
Staal et al, 2004 (13); Staal et al, 2003 (25)	+	+	+	+	+	+	+	?	+	8
Storheim et al, 2003 (21)	+	+	+	+	-	-	-	+	+	6

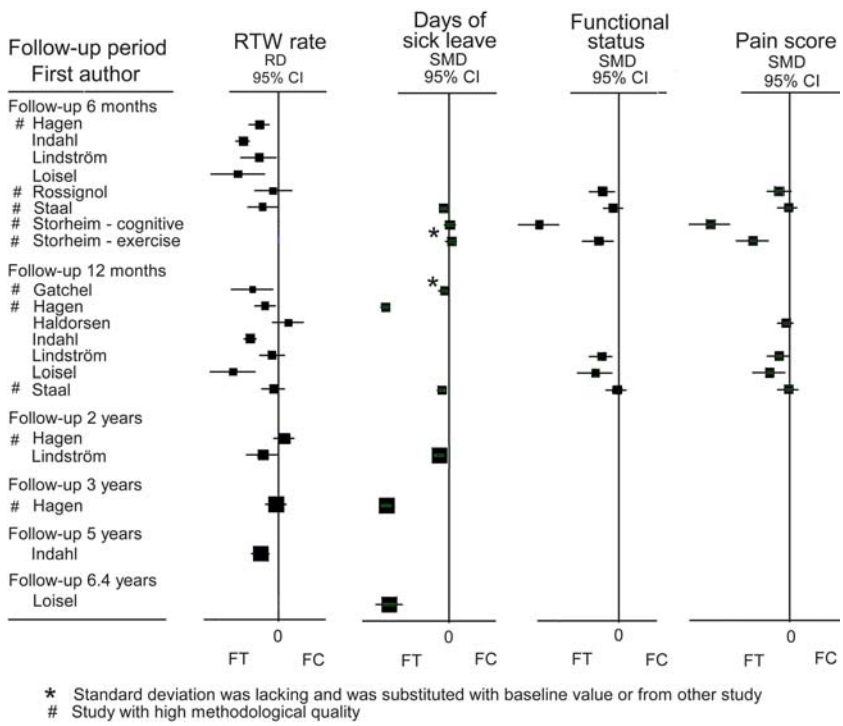

Figure 1. Effect sizes of nine randomized controlled trials on return to work (RTW) interventions compared with usual care, arranged according to the follow-up periods and the outcome measures. Bars represent risk differences (RD) or standardized mean differences (SMD) with 95% confidence intervals (95% CI) for the return-to-work rate, days of absence from work, functional status, and pain score. The effect sizes on the left of the vertical zero line are in favor of the intervention treatments (FT), the sizes to the right are in favor of usual care. (FC = results in favor of the control group)

Effect on work absenteeism expressed as the return-to-work rate

Three high-quality studies (13, 15, 20) and three low-quality studies (17–19) provided data on the return-to-work rate on a short-term follow-up of up to 6 months. Five studies showed a positive effect (13, 15, 17, 19), and only one high-quality study (20) showed no effect of return-to-work intervention on the return-to-work rate. Therefore, we concluded that there is strong evidence for a beneficial effect of return-to-work intervention at 6-months of follow-up on the return-to-work rate, when compared with usual care.

Three high-quality studies (14, 15, 25) and four low-quality studies (16–19) reported data on the return-to-work rate at 12-months of follow-up. Two high-quality studies (14, 15) showed beneficial effects on the return-to-work rate, and these findings were supported by those of two low-quality studies (17, 19). One high-quality (25) and two low-quality (16, 18) studies showed no effect of the return-to-work intervention. Consequently, we concluded that there is conflicting evidence for the effectiveness of return-to-work intervention on the return-to-work rate at 12-months of follow-up.

There were two low-quality studies (23, 24) and one high-quality study (22) that investigated the long-term effect of return-to-work intervention on the return-to-work rate. The follow-up periods varied between 24 months and 5 years. Based on these studies, the evidence was considered conflicting for the effects of return-to-work intervention on the return-to-work rate for long-term follow-up between 2 and 5 years.

Effects on work absenteeism as expressed in days of sick leave

Two high-quality studies reported results on work absenteeism expressed as the number of days of sick leave due to low-back pain at 18-weeks and 6-months of follow-up (13, 21). Storheim et al (21) did not find any effects of return-to-work intervention on the number of days of sick leave at 18-weeks follow-up, while Staal et al (13) found beneficial effects at 6-months of follow-up. These two high-quality studies showed conflicting evidence for the short-term effect of return-to-work intervention on the reduction of sick-leave days.

The results on the number of days of sick leave at 12-months of follow-up were reported in three high-quality studies (14, 15, 25). All three reported a statistically significant reduction of days of sick leave due to return-to-work intervention. The results of the study by Gatchel et al (14) are not presented in figure 1 because the authors did not report standard deviations for days of sick leave. In the published data, a statistically significant effect of the intervention (P=0.001) was reported in favor of the return-to-work intervention. On the basis of the positive results of these three high-quality studies, we concluded that there is strong evidence for the effectiveness of return-to-work intervention on the reduction of the number of sick leave days at 12-months of follow-up.

One high-quality study (22) and two low-quality studies (18, 24) investigated the long-term effects of return-to-work intervention on the number of days of sick leave at a follow-up varying between 2 years and 6.4 years. All of these studies showed a statistically significant beneficial effect of the return-to-work intervention on work absenteeism. Therefore, it is concluded that there is strong evidence for the effectiveness of these return-to-work interventions on work absenteeism at a follow-up of between 2 and 6.4 years.

Return-to-work intervention and functional status

Three high-quality studies reported the results of the effects of return-to-work intervention on functional status at 6-months of follow-up (13, 20, 21). However, these high-quality studies showed inconsistent results. Therefore, we concluded that there is conflicting evidence for the effectiveness of return-to-work intervention on the improvement of functional status at 6-months of follow-up.

The results of the effect of return-to-work intervention on functional status at 12-months of follow-up were reported in one high-quality study (25) and in two low-quality studies (18, 19). Both low-quality studies showed a statistically significant effect on functional status in favor of the return-to-work intervention, but the high-quality study did not confirm this positive effect. Therefore, we concluded that there is conflicting evidence of the effectiveness of return-to-work intervention on the improvement of functional status at 12-months of follow-up.

There were no data with regard to the effectiveness of return-to-work intervention on functional status in follow-ups longer than 12 months.

Return-to-work interventions and pain

Three high-quality studies reported data regarding the effect of return-to-work interventions on the reduction of pain at 6-months of follow-up (20, 21, 25). These high-quality studies showed inconsistent effects of the return-to-work intervention on the severity of pain. We, therefore, concluded that there is conflicting evidence of the effectiveness of return-to-work intervention on pain at 6-months of follow-up.

The results of 12-months of follow-up gave a similar picture. Five studies, two high-quality studies (14, 25) and three low-quality studies (16, 18, 19), showed inconsistent results. The results of the study by Gatchel et al (14) are not presented in figure 1 due to lack of standard deviations. However the original publication reported a statistically significant effect of the intervention on the reduction of pain severity at 12-months of follow-up. Consequently, we concluded that there is conflicting evidence on the effectiveness of return-to-work intervention on pain at 12-months of follow-up.

There were no data available on the long-term effect of return-to-work intervention on the severity of pain.

Clinical relevance of the reviewed studies

All of the reviewed studies compared return-to-work intervention with usual care, and all the studies were intended to be used in clinical practice. Population characteristics, the content of the intervention, and the outcome measures were described well enough for a clinician to judge whether or not the intervention was applicable in a specific situation. Some of the studies did not show a statistically significant beneficial effect on one of the outcome measures with regard to return to work. However, in all of these studies, this effect was at least equal to or better than usual care. None of the studies reported a potential harm of the return-to-work intervention to the workers. Altogether, we concluded that the clinical relevance of all the studies was sufficient.

Discussion

The purpose of this review was to search for evidence for the effectiveness of return-to-work interventions on

absence from work due to subacute low-back pain with a minimal duration of 4 weeks. Nine randomized controlled trials compared return-to-work intervention for subacute low-back pain with usual care. The results of this review, summarized in table 3, showed that return-to-work interventions are more effective than usual care in reducing days of absence from work due to subacute low-back pain.

The evidence was strong for the reduction of the number of days of absence from work at ≥12 months of follow-up and for the return-to-work rate at a shorter follow-up. Scores for pain and functional status in these studies remained unchanged or improved under the influence of return-to-work intervention. Apparently, improvements in functional status and pain do not necessarily go together with earlier return to work.

Methodological consideration

Five of the nine studies met our criteria for high methodological quality. The decision about high and low methodological quality remains arbitrary, and it depends largely on the cut-off point for the sum of positive scores. In this review, a high-quality study had to score positively on at least 50% of the nine methodological quality items. If we would not have reduced the number of methodological items from 11 to 9, we would have identified only three high-quality studies (13, 15, 21).

The average methodological quality scores of the randomized controlled trials included in this review were moderate, and, therefore, the validity was limited, as was the generalizability of the results to other populations. However, the methodological quality of the included randomized controlled trials showed improvement over the years. Three out of the five high-quality studies were published in 2003 or later (13, 14, 21). The fourth study appeared as a 3-year follow-up study also in 2003 (22).

The heterogeneity of the interventions with regard to their content and intensity, and the heterogeneity with regard to different social security systems, also limits the generalizability of the results of our review. A clinician or an occupational physician should take in account these facts when he or she chooses a particular return-to-work intervention for a specific situation.

The use of different outcome measures for the effectiveness of return-to-work interventions (ie, days of absence from work and return-to-work rate) was another problem in our review. The return-to-work rate was based on a dichotomous outcome of work status (being absent from work or not), and it provided information about the percentage of persons who had returned to work at a certain point in time, without giving quantitative information on the number of days of absence from work and the corresponding productivity loss. These data on days of absence from work would be necessary for an estimation of the economic burden of low-back pain.

Table 3. Summary of the results of the best evidence synthesis. (++ = strong evidence in favor of the intervention group, +/- = conflicting evidence)

Outcome measures	Follow-up (6 months)	Follow-up (12 months)	Follow-up long term
Return-to-work rate	++	+/-	+/-
Days of work absenteeism	+/-	+ +	+ +
Pain	+/-	+/-	No data
Functional status	+/-	+/-	No data

Content of return-to-work intervention for low-back pain

The optimal return-to-work intervention for subacute low-back pain is probably a mixture of exercise, education, behavioral treatment, and ergonomic measures, but it is not clear which component, or which combination of components, is the most effective. Furthermore, there could be factors other than those recognized in the randomized controlled trials in this review that were responsible for the success of such return-to-work intervention. These factors are a challenge for future research in the field of return-to-work intervention.

When must return-to-work intervention for low-back pain be started?

Elders et al (27) concluded in their review that starting the intervention in the subacute phase of low-back pain seems preferable. Gatchel et al (14) showed that early intervention in the form of functional restoration among participants with a high risk for developing chronic low-back pain was effective in reducing absence from work and costs. The return-to-work interventions used in the earlier, acute phase of low-back pain did not appear to be effective with respect to absence from work, probably because of the favorable self-limiting course of low-back pain and absence from work during this acute phase (28–30). Treating patients who would recover without treatment anyway is not cost-effective and may even lead to an unnecessary prolonging of the period of being absent from work (31). The subacute phase of low-back pain, between 4 and 12 weeks of absence from work or the duration of complaints, seems to be the most suitable phase for the start of therapy in order to prevent low-back pain from becoming chronic.

Concluding remarks

We found strong evidence for the effectiveness of return-to-work intervention on the reduction of work

absenteeism due to subacute low-back pain in three of six follow-up evaluations. Three other follow-up evaluations showed an equal effect for return-to-work intervention and usual care. Furthermore, no evidence was found that usual care was more effective than return-to-work intervention on the reduction of work absenteeism.

Future research on the effectiveness of return-to-work interventions should concentrate on the evaluation of a limited number of promising return-to-work interventions. A more thorough understanding is also needed about which component of return-to-work interventions or a combination of these components can help to shorten work absenteeism due to subacute low-back pain.

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Appendix

Criteria list for the methodological quality assessment of intervention studies on the effectiveness of return-to-work intervention

A *Was the method of randomization adequate?*
Examples of adequate methods for a random assignment sequence are computer-generated random-number tables and the use of sealed opaque envelopes. Methods of allocation using date of birth, date of admission, hospital numbers, or alternation should not be regarded as appropriate.

B *Was the treatment allocation concealed?*
Assignment should be generated by an independent person not responsible for determining the eligibility of the patients. This person should have no information about the persons included in the trial and no influence on the assignment sequence or on the decision about the eligibility of the patient.

C *Were the groups similar at baseline regarding the most important prognostic indicators?*
In order to receive a plus (+), the groups must be similar at baseline with respect to demographic factors, duration and severity of complaints and symptoms, and value of main outcome measure(s).

D *Was the outcome assessor blinded to the intervention?*
The reviewer determines if enough information about blinding is given in order to score a plus (+).

E *Were co-interventions avoided or similar?*
Co-interventions should either be avoided in the trial design or similar between the index and control groups.

F *Was the compliance acceptable in all groups?*
The reviewer determines if the compliance to the interventions is acceptable, based on the reported intensity, duration, number and frequency of sessions for both the index and control groups.

G *Was the dropout rate described and acceptable?*
The number of participants who were included in the study but did not complete the observation period or were not included in the analysis must be described and the reasons given. If the percentage of withdrawals and dropouts does not exceed 20% for a short-term follow-up and 30% for a long-term follow-up and does not lead to substantial bias a plus (+) is scored.

H *Was the timing of the outcome assessment similar in all groups?*
The timing of outcome assessment should be identical for all the trial groups and for all important outcome assessments.

I *Did the analysis include an intention-to-treat analysis?*
All the randomized patients should be reported or analyzed in the group to which they were allocated by randomization for the most important moments of effect measurement (minus missing values) irrespective of noncompliance and co-intervention.