Return to work after sickness absence due to back disorders

7

a systematic review on intervention strategies

Abstract

Objectives: The aim was to review the literature as to the effectiveness of intervention programmes for the prevention of aggravation of back disorders or prolonged duration of sickness absence.

Methods: A systematic search of the literature was performed using three groups of key words and inclusion/exclusion criteria. Effectiveness was evaluated using two measures: the difference between intervention and referent groups in return to work, and the fraction of sickness absence among referent groups that could be prevented if these referents had undergone the same intervention (preventable fraction).

Results: Twelve articles with quantitative information on the effect of ergonomic interventions on return to work were included. In eight studies, introduction of a back-school programme was the preferred intervention, combining exercise and functional conditioning, and training in working methods and lifting techniques. In seven out of eight back-school studies return to work was significantly better in the intervention group. Intervention after 60-days, in the subacute phase of back pain, showed the most promising results. In these studies the preventable fraction varied between -11% and 80%, largely depending on the stage and phase of back disorders and the time of follow-up. The success of intervention also depended on the profile of the referents when left untampered. In all studies compliance during the intervention was fairly good, but there was a lack of information on sustainability of the intervention during the follow-up and on recurrence of back complaints and consequent sickness absence.

Conclusions: Few studies were performed to assess the outcome return to work after ergonomic intervention. However, there is evidence that intervention in the subacute phase of back pain is preferable. Future intervention studies should address intervention sustainability and recurrence of sickness absence due to back pain over at least a 1-year follow-up period.

Key words: Review, Back disorders, Return to work, Intervention, Back-school.

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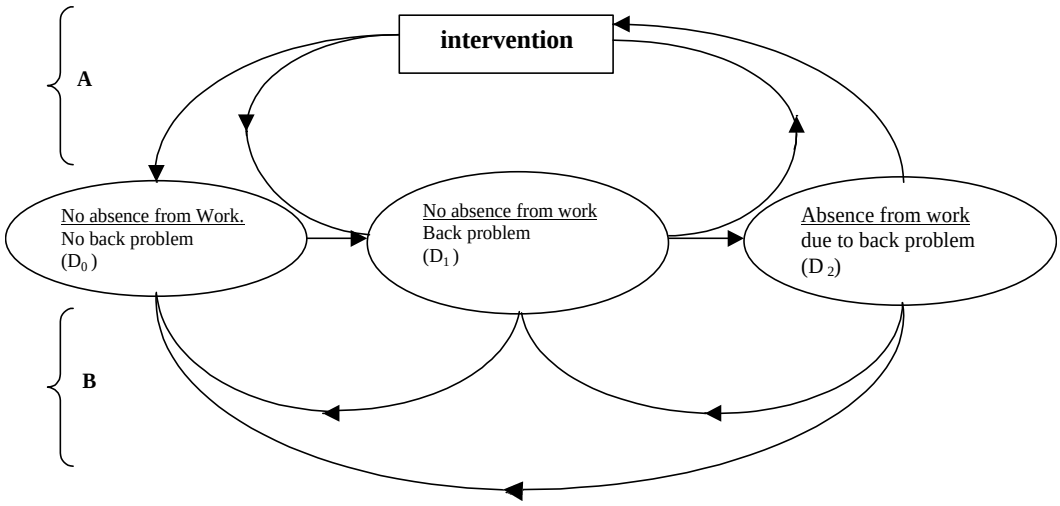
Introduction

In the Netherlands musculoskeletal disorders constitute about 35% of all sickness absence. In the United States this category accounts for 40% of all compensation claims (CTSV1998). Of all musculoskeletal disorders, work-related complaints continue to create the greatest burden to society, particularly in industrialised countries. In the Netherlands the costs of back pain, estimated on a yearly basis in 1991, were $ 5 billion and 1.7% of the Gross National Product (Van Tulder et al. 1995). Figures for the United States (exceeded $50 billion in 1991), Sweden (22.5 billion Swedish Crowns in 1991) and Great Britain (£ 5.2 billion in 1993) also show high costs for low back disorders (Frymoyer 1993, Skargren et al. 1997 and Waddell 1994 respectively).

Many studies have investigated risk factors and the multifactorial aetiology of back pain (Troup 1984, Frank et al. 1995 and Krause et al. 1997). The majority of risk factors is classified and allocated in various working populations (Skovron 1992 and Burdorf & Sorock 1997). In order to decrease exposure to risk factors interventions are needed. To understand the relation between interventions and back disorders a dynamic model is proposed explaining differences in health status and absence from work (based on Burdorf et al. 1997). Figure 1 outlines the relevant details of this model.

In general this model stresses the importance of feedback loops among three health grades: no back problem and no absence from work (D_0), back problem but no absence from work (D_1) and absence from work due to a back problem (D_2). The horizontal arrow between D_0 and D_1 represents the risk factors that may cause the onset of back problems.

Figure 1 Dynamic model for interrelationships among interventions, modifiers and back disorders (A: intervention process: B: spontaneous recovery) {modified model based on Burdorf et al. 1997}



Prognostic factors for absence from work due to back problems are visualised by the arrow between D_1 and D_2. It must be stressed that low back pain (LBP) in most cases shows spontaneous recovery and is, therefore, a self-limiting disease. The spontaneous recovery in the model includes that of both workers who return to work free of complaints and workers who return to work with complaints, but who are capable of working. In the minority of cases some type of intervention is required in order to prevent aggravation of back pain or prolonged duration of sickness absence.

The arrows between D_1, D_2 and intervention represent pro-active and re-active secondary prevention respectively. The latter is of interest in this study. The goal of secondary prevention is limitation of back disorders and recurrence in people who already have back problems (Frank et al. 1996). Arrows leading from the keyword intervention to D_0 and D_1 visualise return to work. The model accounts for the dynamic feedback between the individual worker (with or without back problems) and different types of interventions.

In general, medical and non-medical intervention strategies can be distinguished. It would be of great help if general practitioners and occupational physicians could benefit from protocols or management guidelines for various types of interventions. In several countries like the Netherlands, the United Kingdom and the United States medical treatment guidelines for back disorders exist (Faas et al.1996, Rosen et al.1994 and Bigos et al.1994 respectively). Although these guidelines are based upon consensus among practitioners, there is little knowledge about its effectiveness for return to work. The question as to whether General Practitioner consensus is appropriate for working populations remains unanswered. Occupational guidelines should be developed to enable the occupational physician to coach the worker with a back disorder on a problem-orientated basis. The recently published Practice Guidelines for Low Back Pain for occupational physicians in The Netherlands are a promising example (Dutch Society of Occupational Physicians 1999). However more knowledge on the intervention spectrum is required to facilitate the occupational physician in the reduction of sick leave.

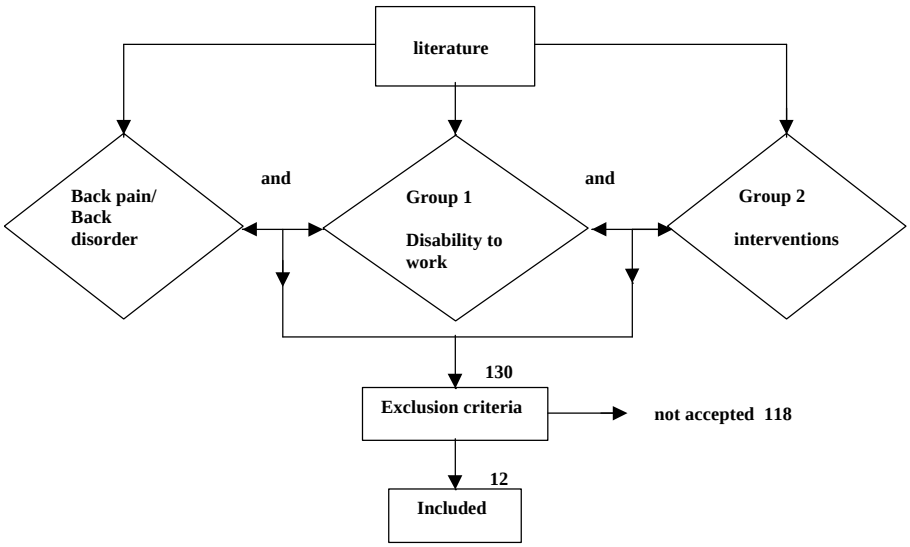
This review is focused on ergonomic, non-invasive and non-medical interventions. The main purpose is to review the literature systematically, on secondary prevention for back disorders in the working population. Return to work is the primary measure of outcome.

Methods

Retrieval of reviewed studies was performed by a search on MEDLINE (from 1966-January 1999), PSYCLIT (from 1887- September1998), EMBASE (1988- November 1998), CINAHL (1982- March 1998), Current Contents/ Clinical Medicine (February 1998-Februari 1999), Current Contents/ Life Sciences (February 1998- March 1999), CISDOC (1987-January1999), HSELINE (1987-January 1999), MHIDAS (1985-January1999) and NIOSHTIC (1990-January1999). The literature-search combined the key words "back pain" or "back disorder" with two other groups of keywords (groups 1 and 2): group 1 emphasised disability to work (sickness absence, absenteeism, return to work, sick-leave, workers compensation, and employment status), and group 2 focused on the different

types of intervention (intervention, prevention, workplace, ergonomic intervention, design, vocational, education, lifting techniques, control, lumbar support, back-school, training, modified work, graded activity, and functional restoration). In the search the key words "back pain" or "back disorder" had to be present in combination with one or more words from the first group as well as from the second group. Figure 2 shows a flowchart of the systematic literature-search. Screening on relevant references in retrieved articles and published reviews completed the search.

Figure 2 Flowchart of systematic literature search for intervention studies with return to work after sick-listing as the measure of outcome. The search combined the keywords " back pain" and "back disorder" with two groups of keywords (group 1: sickness absence, absenteeism, return to work, sick-leave, workers compensation and employment status), (group 2: intervention, prevention, workplace, ergonomic intervention, design, vocational, education, lifting techniques, control, lumbar support, back-school, training, modified work, graded activity and functional restoration).



The inclusion criteria were met if a study had the following characteristics:

1. Sickness absence in the working population was described and quantified before and after the intervention was imposed. The outcome parameter should be return to work (RTW).
2. The intervention concerned a secondary type of non-medical prevention, regarding non-specific back pain or back disorders either acute, subacute, or chronic. Duration of sick leave before intervention should not exceed 1 year.
3. The article was published in English.

Apart from the inclusion criteria several exclusion criteria were used. Exclusions were made for back disorders in pregnant women, individual case management, substantial co-morbidity with other diseases, absence of a reference group and study subjects who were unemployed or on sick-leave with a duration of more than 1 year at the start of the investigation. There was no selection on study design. Although a lot of studies were randomised controlled trials (RCT), no exception was made for other types of investigation. In this review, articles were also excluded when the report did not concern assessment of disorders of the lower part of the spine known as the lower back.

The retrieved articles that met the inclusion and exclusion criteria, were assigned to three main groups of interventions concerning back problems (Zwerling et al. 1997):

1. *organisational and administrative interventions*
   a. modified work and early return to work (e.g. graded activity)
   b. treatment guidelines
2. *technical, engineering or ergonomic interventions*
   a. adjusted tables and chairs at working place
   b. (re) design of workplace
   c. (re) design of working aids or tools
3. *personal interventions (imposed on a group of workers)*
   a. availability of personal protective equipment (e.g. back belts/lumbar supports)
   b. exercise and functional conditioning
   c. training in work methods and lifting techniques back-school
   d. education (psychosocial, behavioural)

The distinction between acute, subacute, and chronic LBP depended on the period of sickleave in which LBP was present. It was rated acute if it lasted less than 30 days, subacute if it lasted for 30 days or longer but less than 12 weeks, and if LBP was present for 12 weeks or more this condition was rated as chronic.

The impact of the intervention was evaluated on three aspects: compliance, compliance sustainability, and effect sustainability (Westgaard and Winkel 1997). Compliance is defined as the way in which subjects act in accordance with the imposed intervention during the intervention period, and is rated good if more than 80% of the subjects comply with the imposed intervention. Compliance is reasonable if this figure lies between 30% and 80% and is poor if this figure drops below 30%. Compliance sustainability is defined as compliance with the intervention during the follow-up period, i.e. after the intervention has been imposed. It reveals information about the way in which the subjects still act in accordance with the intervention although the imposed intervention has already been terminated.

Compliance sustainability is rated good if the compliance is sustained after the intervention period in more than 80% of the cases. Compliance sustainability is reasonable if between 30% and 80% of the subjects sustain the intervention, and is poor if less than 30% sustain the intervention after the intervention period.

Effect sustainability is defined as the way in which RTW is sustained without any recurrence of new periods of sickness absence during the follow-up period. Effect sustainability is rated good if the percentage of recurrence among the cases is 30% or less, reasonable for recurrence of 30% to 80%, and poor if recurrence is more than 80%. Compliance, compliance sustainability, and effect sustainability are rated as unknown if no information was available.

In order to estimate the effect of the intervention quantitatively, we calculated two additional measures. The Rate Difference (RD) was calculated as the absolute difference between the percentage of RTW of the subjects and the percentage of RTW of the referents. The Preventable Fraction (PF) was calculated as a relative difference between sickness absence of the referents and sickness absence of the subjects, divided by sickness absence of the referents. In other words, the PF is that part of the sickness absence among the referents that could be prevented if the intervention had also been imposed on them.

$$PF = \frac{\text{sickness absence referents - sickness absence cases}}{\text{sickness absence referents}} \times 100\%$$

$$= \frac{RD}{\text{sickness absence referents}} \times 100\%$$

To indicate statistical significance a level of $P < 0.05$ was used.

Results

The search retrieved 515 articles. By reading the abstracts, we diminished the number of selected articles to a total of 130, of which 20 were reviews. The remaining 110 articles consisted of 41 prospective cohort studies, 38 RCT's, 15 retrospective studies, four cross-sectional studies, and 12 descriptive studies. After application of exclusion criteria, we rejected 36 articles because of absence of the outcome parameter RTW; five reports were rejected because they dealt with primary prevention; another five studies dealt with tertiary prevention, and 18 described no intervention at all. Of the 46 remaining investigations, 31 were rejected because they lacked an appropriate reference group, which made it impossible to estimate the effect of the intervention. Three articles were rejected because of co-morbidity such as work-related soft tissue injury, radiculopathy, herniation and protrusion of discs, severe personality disorder, and severe psychosis (Corey et al. 1996, Oland et al. 1991, Bendix et al. 1998). Hence, 12 studies remained for this review. The main results of the investigations are presented in Table 1.

Of the 12 remaining reports nine are (RCTs) and three are prospective cohort studies. The interventions were specially focused on exercise and functional conditioning (11 studies), education (nine), and training in work methods and lifting techniques (eight investigations). In nine studies one or more combinations of interventions were used. Only one study used treatment guidelines as an intervention strategy (Hazard et al. 1997). In another report a technical intervention was part of the intervention (Loisel et al. 1997).

In eight studies a combination of exercise and functional conditioning, education and training in working methods, and lifting techniques was applied, often described as a back school type of intervention (Bergquist -Ullman and Larsson 1977, Burke et al. 1994, Indahl et al. 1995, Indahl et al. 1998, Leclaire et al. 1996, Lindström et al. 1992, Loisel et al. 1997, Van Doorn 1995). One study used a combination of exercise, functional conditioning, and education (Stankovic et al. 1990). Two investigations focused on exercise and functional conditioning as intervention strategy (Sinclair et al. 1997, Tortensen et al. 1998). In eight reports significant overall difference in RTW was shown between cases and referents.

The population under study varied in number between 30 and 463 workers for the cases and between 29 and 523 workers for the referents. There were large differences among the populations: in 3 three investigations, the population was working in a factory (Bergquist -Ullman and Larsson 1977, Lindström et al. 1992, Loisel et al. 1997). In only one study were job-titles mentioned (Van Doorn 1995). In three other reports, patients were selected after referral to a medical centre or spine clinic (Burke et al. 1994, Indahl et al. 1995, 1998). In four studies, patients were selected from a group of workers who had been compensated by insurance companies or a compensation board (Van Doorn 1995, Leclaire et al. 1996, Sinclair et al. 1997, Torstensen et al. 1998).

In one study patients were accepted when reporting work-related injuries (Hazard et al 1997) and in another study patients who were out of work were included (Stankovic and Johnell 1990).

The compliance with intervention by the population under study was good in eight studies, reasonable in two studies, poor in one, and unknown in another. Compliance sustainability showed a different picture. Only three studies were rated good, one was rated poor, and in the others, sustainability was unknown. The effect sustainability was good in three reports, reasonable in three, poor in two and unknown in four investigations (Table 1). The results of the various studies quantified by the (RD) and (PF) are presented in Table 2 (back- school interventions) and Table 3 (other interventions).

As is shown in Table 2, the effect of back-school programmes varied widely among studies and in time. Most reports demonstrated an effect 60 days or more after the intervention started. Shorter periods showed contradictory results with both positive and negative effects. Among other intervention studies, as shown in Table 3, only the Mc Kenzie method had a significant effect on early return to work with a PF ranging between 78% and 100%.

Table 1 Results of 12 intervention studies on return to work after sick-listing due to low back pain (RCT randomised controlled trial)

Author	Study design	Population	Intervention	Return to work	Impact - Compliance - Compliance sustainability - Effect sustainability
Bergquist-Ullman and and Larsson (1977)	RCT	55 cases and 61 referents A and 66 referents B with back pain for 8 weeks or less	Back-school versus physical therapy/manipulation (reference group A) and placebo therapy (reference group B)	After 21 days: 67% among cases 49% among referents A (ns) 38% among referents B (s)	- reasonable - unknown - poor
Burke et al. (1994)	prospective cohort study	303 cases and 94 referents with less than 6 weeks of low back pathology	Functional restoration program using work simulation versus other care by physician	After 6 months: 62% among cases 30% among referents (s) After 12 months: 77% among cases 35% among referents (s)	- good - unknown - unknown
Hazard et al. (1997)	RCT	30 cases and 29 referents with work-related back injury less than 12 days	Physician notification of treatment guidelines (AHCPR) about recommendations for limiting work loss versus no intervention at all	After 3 months: 71% among cases 76% among referents (ns)	- poor - poor - unknown
Indahl et al. (1995)	RCT	463 cases and 512 referents with work-related low back pain more than 8 weeks	Mini back-school versus usual care	After 200 days: 70% among cases, 40% among referents (s)	- good - good - reasonable
Indahl et al. (1998)	RCT	245 cases and 244 referents with low back pain between 4 and 12 weeks	Mini back-school versus usual care	After 5 years: 81% among cases 65% among referents (s)	- good - unknown - poor
Leclaire et al. (1996)	RCT	82 cases and 86 referents with work-related low back pain less than 3 months	Back-school program versus usual care	After 1 months: 37% among cases 36% among referents (ns) After 2 months: 90% among cases 94 % among referents (ns) After 1 year: 98% among cases 99% among referents (ns)	- good - good - good

Table 1 Continued

Author	Study design	Population	Intervention	Return to work	Impact - Compliance - Compliance sustainability - Effect sustainability
Lindström et al. (1992)	RCT	51 cases and 52 referents with low back pain for 8 weeks or more	Graded activity program including back-school and work place visit versus usual care	After 6 weeks: 59% among cases 40 % among referents (s) After 12 weeks: 80 % among cases 58 % among referents (s)	- good - good - reasonable
Loisel et al. (1997)	RCT	25 cases and 26 referents with thoracic or lumbar back pain 6 weeks or more	Sherbrooke model: multidisciplinary work rehabilitation intervention versus usual care	After 30 days: 28% among cases 35% among referents (ns) After 60 days: 48% among cases 38% among referents (ns) After 90 days: 68% among cases 43% among referents (ns) After 180 days: 92% among cases 54% among referents (s) After 360 days: 92% among cases 62% among referents (s)	- good - unknown - unknown
Sinclair et al. (1997)	Prospective cohort study	355 cases and 523 referents with work-related back less than 21 days	Combination of pain relief, functional conditioning and education versus usual care	After 30 days: 18% among cases 27% among referents (s) After 60 days: 51% among cases 54% among referents (ns) After 90 days: 68% among cases 66% among referents (ns)	- reasonable - unknown - good

Table 1 Continued

Author	Study design	Population	Intervention	Return to work	Impact - Compliance - Compliance sustainability - Effect sustainability
Stankovic and Johnell (1990)	RCT	50 cases and 50 referents with acute low back pain (time unknown)	McKenzie method, exercise, functional conditioning and education versus education only	After 3 weeks: 93% among cases 68% among referents (s) After 4 weeks: 98% among cases 80% among referents (s) After 5 weeks: 98% among cases 84% among referents (s) After 6 weeks: 100% among cases 88% among referents (s) Within 11 weeks: referents 100%	- good - unknown - reasonable
Torstensen et al. (1998)	RCT	71cases and 67referents A and 70 referents B with 8 to 52 weeks of low back pain	Graded medical exercise versus conventional physiotherapy (A) and self excercise (B)	After 1 year: 58% among cases 63% among referents A (ns) 57% among referents B (ns)	- good - unknown - unknown
Van Doorn. (1995)	Prospective cohort study	134 cases and 195 referents with acute specific and non-specific low back pain	Early intervention program with an integrated approach (medical, ergonomic, psychological/ sociological) versus usual care and operative treatment	After 1 year: 90% among cases 79% among referents (s)	- unknown - unknown - good

Discussion

The search retrieved 12 studies, of which eight were overall significant. All significant investigations, except for one, considered back-school interventions. These intervention studies combined exercise and functional conditioning, and education and training in working methods with lifting techniques. The absolute reduction of sickness absence and time lost from work (the RD) ranged from 22-42%. The PF, as a relative measure for the preventable sickness absence among referents, varied from 50-70%. The differences in intervention outcome were partly due to differences in study design and populations under investigation.

According to Scheer et al. (1995) the first RCT, using RTW as a measure of outcome in relation to LBP, was already published as early as 1973. It is surprising that in this review only 12 studies were found, of which nine RCT's met the inclusion criteria. All the included studies except for one (Bergquist-Ullman and Larsson 1977) were published in the past decade. There are two reasons explaining the fact that RTW has become more important in research in the past decade: it is easy to determine and it is of great economic value (Lindström et al. 1992). In order to interpret the results the most important elements to discuss are: heterogeneity of study populations, type of intervention, and compliance with, and sustainability of, the intervention.

Selection of subjects

The populations in the reviewed articles were heterogeneous, but were usually selected from subjects with low back pain who sought medical treatment and/or who filed a disability claim related to their sickness absence. They differed in duration or stage of LBP at the start of the study. In five investigations workers entered the study in the acute phase of LBP (Bergquist-Ullman and Larsson 1977, Hazard et al. 1997, Sinclair et al. 1997, Stankovic and Johnell 1990, Van Doorn 1995). In three of these reports, the overall results were significant (Bergquist-Ullman and Larsson 1977, Stankovic and Johnell 1990, Van Doorn 1995). In seven investigations, the workers entered the study while in the subacute phase of LBP (Burke et al. 1994, Indahl et al. 1995, 1998, Leclaire et al. 1996, Lindström et al. 1992, Loisel et al. 1997, Torstensen et al. 1998). In only two of these studies were results not significant (Leclaire et al. 1996, Torstensen et al. 1998). These findings do not allow us to make a distinction in preferred intervention with regard to LBP status. Due to the strong recovery in the early stage of LBP the demonstration of an intervention effect on workers with acute LBP is only possible if the effect itself is very large or if the study population is very large. Leclaire et al. (1996) for instance, mentioned the lack of power of the study as one of the possible reasons why their results were not significant. In general, a lack of consensus on both the stage and the contents of the intervention, needed to increase RTW, is still present (Frank et al. 1998).

Substantial co-morbidity with other diseases was an exclusion criterion, because of the confounding effect on the intervention results. In four studies special attention was given to this item. In one investigation, 19% of the subjects and 11% of the referents had psychosocial problems (Van Doorn 1995). This report was included because the problems were not purely psychological.

Table 2 The effect of back-school intervention programmes on return to work among workers with sick leave due to back pain

Author	Days after intervention %	Rate difference %	Preventable fraction
Bergquist-Ullman and Larsson (1997)	21	29 [a]	47 [a]
Burke et al. (1994)	180	32	46
	360	42	65
Indahl et al. (1995)	200	30	50
Indahl et al. (1998)	1800	16	46
Leclaire et al. (1996)	30	1	12
	60	-4	-67
	360	-1	-100
Lindström et al. (1992)	42	19	32
	84	22	50
Loisel et al. (1997)	30	-7	-11
	60	10	16
	90	25	44
	180	37	80
	360	29	76
Van Doorn (1995)	360	11	52

[a] Placebo therapy group [see also Table 1. Bergquist-Ullman and Larsson (1977)]

Table 3 The effect of intervention programmes on return to work among workers with sick leave due to back pain (n.c.p. no calculation possible)

Author	Intervention	Days after intervention	Rate difference (%)	Preventable fraction (%)
Hazard et al. (1997)	Treatment guidelines	90	-5	-21
Sinclair et al.(1997)	Pain relief, functional	30	-9	-12
	conditioning and	60	-3	-7
	eduction	90	2	6
Stankovic and Johnell (1990)	McKenzie method	21	25	78
	(1990)	28	18	90
		35	14	88
		42	12	100
		77	0	n.c.p.
Torstensen et al. (1998)	Graded medical exercise	360	-5 [a]	14 [a]
			1 [b]	2 [b]

[a] Conventional physiotherapy as reference
[b] Self-exercise as reference

Three studies reported that the patients had been treated before entering the study (Burke et al. 1994, Lindström et al. 1992, Sinclair et al. 1997). The treatment, however, was judged to bear no influence on the intervention that followed.

Back-school type interventions

Seven out of eight back-school intervention studies showed a significant overall difference between RTW of the subjects and of the referents. One study showed no statistical difference in the follow-up period, which may be due to the mean duration of sickness absence of only 15 days (Leclaire et al. 1996).

The effect of the intervention was partly determined by the outcome measure that was used and the period of follow-up of this measure. The calculated RD and PF might illustrate this problem (Table 2). From 60 days until 1 year after the start of a back-school type of intervention, a significant effect was found in only four out of eight studies (Burke et al. 1994, Indahl et al. 1995, Lindström et al. 1992, Loisel et al. 1997). The calculated RD in these studies varied between 22% and 42%. This finding is in accordance with the literature, which shows reduction of time lost from work of between 30% and 50% (Frank et al 1998). However, in the period between the start of the intervention and 60 days of follow-up, RD showed a scattered picture for the back-school type of interventions with substantially lower RDs. These findings suggest that the intervention should not start too soon the subject falls ill with LBP and that a considerable follow-up is required to demonstrate any effect of the intervention. Bergquist-Ullman and Larsson (1977) showed a positive effect only during the first period after intervention, but no effect thereafter. Maybe this could be a placebo effect (Faas et al. 1996). Leclaire et al. (1996) showed some effect only in the first 30 days, but a negative RD after that period. They blamed a lack of intensity of the intervention programme for these results. However, the real reason might be the presence of the acute phase of LBP at the starting point. Starting too early is cross-passing the self-limiting effect of LBP. Why this investigation showed a negative RD after 30 days remains unexplained. A study that offers the opposite picture is published by Loisel et al. (1997). Before the 60 day follow-up period the results showed a negative RD. After that period, the results became positive. Although the numbers of cases and referents were low, this might suggest that the Sherbrooke model, which links medical care to worksite interventions, could be efficacious.

Apart from the RD, we also calculated the PF, which, in our study, is that part of the sickness absence among referents that could be prevented if the referents had used the same intervention program as the subjects did. The level of PF depends on the RD and sickness absence of the referents. In order to understand the significance of PF, the RD and sickness absence of the referents should always be taken into account. In studies with a significant back-school intervention, the PF after 60 days ranged between 50 and 76% (Table 2). This indicates that a back-school may be a powerful intervention.

In the discussion about PF values we concentrate on two studies with a back-school intervention with a repeated measurement of the intervention effect after 60 days (Burke et al. 1994, Loisel et al. 1997). The Sherbrooke model combined clinical care with rehabilitation intervention (Loisel et al. 1997).

The functional restoration program by Burke et al. (1994) consisted of strength-, education- and work simulation evaluation. Selection of patients before entry into the study, by a work capacity assessment was essential in the study of Burke et al. (1994). This selection was not made by Loisel et al. (1997) who focused on attention at the workplace and exercise aimed at work.

In both studies the PF values are high which suggests that these interventions were efficacious. But a high PF in the study of Loisel et al. (1997) was caused by the lack of RTW of referents. In general the referents, who remain ill or suffer from short recurrent periods of sick leave during the follow-up period, determine the effect of the intervention. Nevertheless the Sherbrooke model and the functional restoration programme demonstrated mutual promising results.

Non back-school type interventions

The non back-school type of interventions presented no significant effect except in one study (Stankovic and Johnell 1990). Stankovic and Johnell (1990) showed a significant effect shortly after starting the intervention, but after 60 days no effect was left, since all referents had returned to work. Hence, the calculated RD at 11 weeks was 0. In three studies, RTW was better among referents than in the subjects. Hence, the intervention seemed to result in an almost opposite effect (Hazard et al. 1997, Sinclair et al. 1997, Torstensen et al. 1998).

One study published by Sinclair et al. (1997) was likely to show no result. The intervention was not workplace related, was started too soon after sick leave due to LBP, and RTW meant the end of receiving benefits. If so many interfering variables are built into the study it could jeopardise the results.

Hazard et al. (1997) also intervened in the acute phase of LBP and tried to notify the physician to apply practice guidelines in therapy. The compliance of the physician with the intervention was poor, and almost no patients were treated according to the intervention. This resulted in a negative RD. At 90 days RTW was slightly higher among referents than among subjects. This illustrates that if there is no intervention in the case of the subjects, the referents and the subjects show a similar pattern of RTW.

Torstensen et al. (1998) studied the effect of medical exercise, conventional physiotherapy and self-exercise. The effect on RTW was not significant after 1 year. Reduction in pain, a positive effect on functional activity of daily living and cost reduction (cost-benefit analysis) were significantly better for the medical exercise and physiotherapy group. Although this was promising it did not have any effect on RTW. The authors, however, criticised RTW as a measure of outcome, because it could be influenced by factors other than medical and therapeutic intervention.

Compliance and sustainability

Compliance with the imposed intervention is defined as the way in which subjects act in accordance with the imposed intervention. Compliance was fairly good or reasonable in most studies. In only one study the compliance was poor and the results were not significant (Hazard et al. 1997). Identification of persons predisposed to bad compliance or to leave the intervention programme is very important for the success of a study (Carosella et al. 1994).

The study of Loisel et al. (1997) gave a good example of the fact that attention to compliance with the intervention protocol during the follow-up period is important. Although their study lacked quantified information on compliance sustainability, it was always an item of attention in the protocol. In only four studies the compliance sustainability during the follow-up period was mentioned. The lack of information hampers any conclusions. Therefore, it is recommended that the design of any intervention study considers an evaluation of compliance sustainability (Westgaard and Winkel 1997).

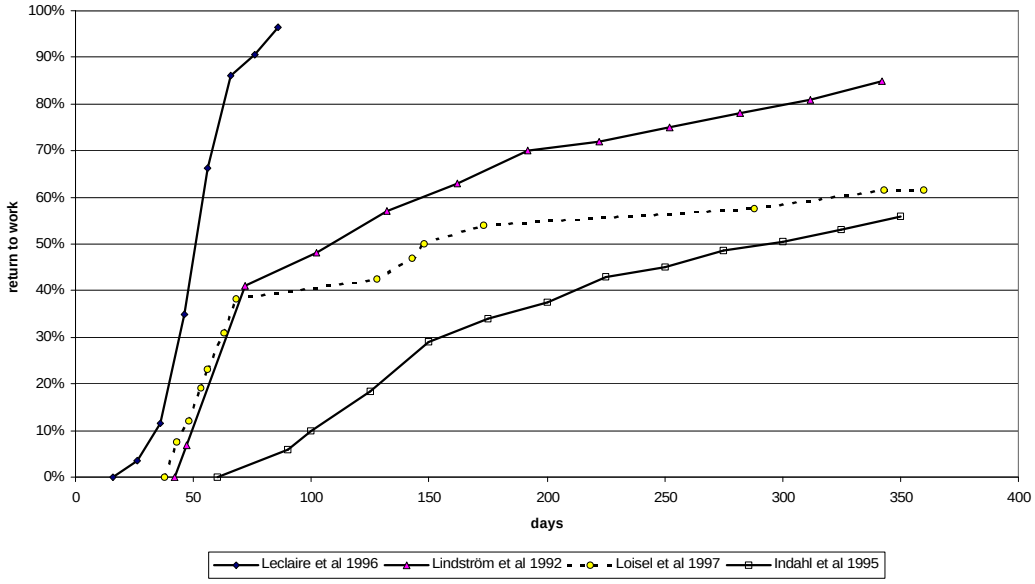
In order to detect recurrence of LBP and sickness absence, evaluation of effect sustainability should be part of the intervention protocol. The hypothesis that compliance with the intervention at any time can affect reduction of sickness absence in the short-term as well as in the long-term should be studied in future RCTs.

RTW of referents when left untampered

Figure 3 reveals data about RTW of the referents in four studies on the effect of back-school intervention. (Indahl et al. 1995, Leclaire et al. 1996, Lindström et al. 1992, Loisel et al. 1997). All referents received usual care. The figure illustrates the large differences among reference groups, and, hence identifies an important source of non-comparability. Firstly, referents were included at different times ranging from 16 to 60 days. Secondly, inclusion-criteria of referents differed in almost every study. In one report referents were only included if they had no previous episodes of LBP (Leclaire et al. 1996), while in the remaining studies this did not hamper inclusion. Thirdly, at the end of the follow-up period, all curves show different end-points of RTW, ranging from 56% to 96.5%. Fourthly, there are only a few longitudinal studies that measure RTW on a continuous basis.

The curves in figure 3 show a comparable slope in the first period of 60 days, implying similar rates of RTW. In this episode of sickness absence, the curve, symbolising RTW of the referents, seems to be independent of the population. The difference in RTW might be explained by the self-limiting effect of LBP and the variability in prevalence of LBP between populations. The study of Leclaire et al. (1996) illustrates that RTW is much higher among patients with less severe complaints.

Figure 3 Return to work of the referents in four back-school studies when left untampered



After 60 days the curves disperse (Leclaire et al. 1996, Lindström et al. 1992, Loisel et al. 1997). In a comparison of the slopes of the curves, the rate of RTW in two studies is similar (Indahl et al. 1995, Lindström et al. 1992). These studies, however, varied in intervention strategy and selection of populations, including those of the referents.

Another difference is the endpoint of RTW at the end of the follow-up period. The referents in the study of Leclaire et al. (1996) reached a RTW-level of 97% after 70 days. In the other studies, the RTW of the referents stayed far below this level. It can be concluded that heterogeneity of the study population is substantial. But more important is the fact that the success of an intervention depends on the profile of the referents when left untampered.

Conclusion

Back-school type interventions, regardless of their programme and heterogeneity, showed more effect after 60 days of sickness absence than other non back-school interventions. Intervention in the subacute phase seems preferable, unless a strong intervention effect can be exercised upon the already strong recovery among patients in the early phase of LBP. Compliance with the imposed intervention was rather good, but the compliance sustainability and effect sustainability were unknown in many studies. Compliance, compliance sustainability, and effect sustainability should be part of the study protocol. The calculation of PF and RD in combination with RTW of the referents would put study results in a better perspective. A low RTW among referents may strongly influence the magnitude of the intervention effect.

Few studies focused on workload and its consequence on return to work. In general, RCTs concerning an organisational and technical intervention, sustained over a follow-up period of at least 1-year, with special attention to the recurrence of LBP sick leave, should be the aim in future research.

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