Occupational health guidelines for the management of low back pain at work: evidence review

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There is increasing demand for evidence-based health care. Back pain is one of the most common and difficult occupational health problems, but there has been no readily available evidence base or guidance on management. There are well-established clinical guidelines for the management of low back pain, but these provide limited guidance on the occupational aspects. *Occupational Health Guidelines for the Management of Low Back Pain at Work* were launched by the Faculty of Occupational Medicine in March 2000. These are the first national occupational health guidelines in the UK and, as far as we are aware, the first truly evidence-linked occupational health guidelines for back pain in the world. They were based on an extensive, systematic review of the scientific literature predominantly from occupational settings or concerning occupational outcomes. The full evidence review is on the Faculty web site (www.facoccmed.ac.uk), but an abridged version is presented here to aid its dissemination.

Key words: Back pain; evidence-based practice; guidelines; intervention; management; occupational health; prevention; rehabilitation; systematic review.

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Introduction

This systematic review of the scientific literature on occupational aspects of low back pain was conducted for the UK Faculty of Occupational Medicine to provide a scientific evidence base from which to develop occupational health guidelines. The guidelines [1], the full text of the evidence review [2] and an accompanying leaflet for employers were launched on 29 March 2000 by the Faculty of Occupational Medicine, all of which are available from their web site (www.facoccmed.ac.uk). In recognition that clinical guidelines, and particularly their background evidence syntheses, often suffer from limited dissemination, an abridged version of the evidence review is offered here. The actual evidence statements and their linking are reproduced exactly, but certain elements, such as the detailed review methodology and the extensive evidence tables, have been omitted. Interested readers are encouraged to obtain these from the Faculty's web site.

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Methods

The guidelines and the review are concerned with non-specific low back pain (abbreviated simply as LBP) unless stated otherwise. The main target for the literature search was evidence from occupational settings or concerning occupational outcomes. The review methodology broadly followed that of the Royal College of General Practitioners (RCGP) clinical guidelines [3,4] and the Swedish SBU Report on back pain [5], but recognized the methodological limitations of research in occupational settings [6].

The scientific evidence on LBP is now so extensive that it is impossible to carry out a complete systematic review of every aspect of management *de novo* to an acceptable high standard within an acceptable timescale and using reasonable resources. The present evidence review therefore started with a search for all published, methodologically sound, systematic reviews. These were supplemented by narrative reviews and original scientific studies in key areas of interest or where systematic reviews were unavailable. The methodology of the review may be best summarized as systematic searching plus rating of the

strength of the evidence plus a narrative overview, by agreement between two experienced and independently minded reviewers.

The literature was searched systematically to September 1999, using a variety of standard methods [2]. More than 2000 titles and abstracts were considered. The final selection included 34 systematic reviews, 28 narrative reviews and 52 additional scientific studies, 22 relevant but scientifically weaker studies, and 17 previous guidelines. The full tabulation of these publications, along with descriptive notes, can be found elsewhere (www.facoccmed.ac.uk).

We used the RCGP three-star system as modified in the SBU report for scientific studies, but added a fourth category to accommodate additional clinical studies and modified the wording of the definitions slightly to allow for this.

*** *Strong evidence*—provided by generally consistent findings in multiple, high quality scientific studies.
** *Moderate evidence*—provided by generally consistent findings in fewer, smaller or lower quality scientific studies.
* *Limited or contradictory evidence*—provided by one scientific study or inconsistent findings in multiple scientific studies.
– *No scientific evidence*—based on clinical studies, theoretical considerations and/or clinical consensus.

Evidence linking was to the most comprehensive and most recent source available. Where possible, this was to systematic review(s), which should include all of the earlier, original studies in that area. Direct reference to original studies was only made where there was no adequate review, where they were not included in the review(s) or where they were necessary to support an important point. It is stressed that weak evidence statements on a particular relationship or effect do not necessarily mean that it is untrue or unimportant, but may simply reflect insufficient evidence or the limitations of current scientific investigations.

The resultant evidence is presented below under a logical sequence of occupational health situations. Evidence statements for each situation are preceded by an introduction to the relevant issues and some important areas are given additional discussion.

Evidence statements and narrative comment

A. Background

LBP can be occupational in the sense that it is common in adults of working age, frequently affects capacity for work and often presents for occupational health care. It is commonly assumed this means that LBP is caused by work, but the relationship between the physical demands of work and LBP is complex and inconsistent. A clear distinction should be made between the presence of symptoms, the reporting of LBP, attributing symptoms to work, reporting 'injury', seeking health care, loss of time from work and long-term damage. LBP in the occupational setting must be seen against the high background prevalence and recurrence rates of low back symptoms, and to a lesser extent disability, among the adult population. Workers in heavy manual jobs do report rather more low back symptoms, but most people in lighter jobs or even those who are not working have similar symptoms. Jobs with greater physical demands commonly have a higher rate of reported low back injuries, but most of these 'injuries' are related to normal everyday activities such as bending and lifting, there is usually little if any objective evidence of tissue damage (though clinical examination and current *in vivo* investigations may be insensitive tools to detect this), and the relationship between job demands and symptoms or injury rates is inconsistent. Physical stressors may overload certain structures in individual cases, but, in general, there is little evidence that physical loading in modern work causes permanent damage. Whether low back symptoms are attributed to work, are reported as 'injuries', lead to health care seeking and/or result in time off work depends on complex individual psychosocial and work organizational factors. The development of chronic pain and disability depends more on individual and work-related psychosocial issues than on physical or clinical features. People with physically or psychologically demanding jobs may have more difficulty working when they have LBP, and so lose more time from work, but that can be the effect rather than the cause of their LBP.

In summary, physical demands of work can precipitate individual attacks of LBP, certain individuals may be more susceptible and certain jobs may be higher risk, but, viewed overall, physical demands of work account for only a modest proportion of the total impact of LBP occurring in workers [7–16].

A1 *** Most adults (60–80%) experience LBP at some time, and it is often persistent or recurrent. It is one of the most common reasons for seeking health care, and it is now one of the commonest health reasons given for work loss [10,11,15, 17–19].

A2 *** There is strong epidemiological evidence that physical demands of work (manual materials handling, lifting, bending, twisting and whole body vibration) can be associated with increased reports of back symptoms, aggravation of symptoms and 'injuries' [7,9,11,12,14,20–25].

A3 * There is limited and contradictory evidence that the length of exposure to physical stressors at work

(cumulative risk) increases reports of back symptoms or of persistent symptoms [9,20,23,25–28].

A4 *** There is strong evidence that physical demands of work (manual materials handling, lifting, bending, twisting and whole body vibration) are a risk factor for the incidence (onset) of LBP, but overall it appears that the size of the effect is less than that of other individual, non-occupational and unidentified factors [7,12,14,21,25,29].

(Note: A2 and A4 are not incompatible. Whilst the epidemiological evidence shows that low back symptoms are commonly linked to physical demands of work, that does not necessarily mean that LBP is caused by work. Although there is strong scientific evidence that physical demands of work can cause individual attacks of LBP, overall it accounts for only a modest proportion of all LBP occurring in workers.)

A5 ** There is moderate scientific evidence that physical demands of work play only a minor role in the development of disc degeneration [30,31].

A6 *** There is strong epidemiological and clinical evidence that care seeking and disability due to LBP depend more on complex individual and work-related psychosocial factors than on clinical features or physical demands of work [12,14,15,32].

B. Pre-placement assessment

Individual health, fitness and strength can affect the ability to perform tasks. Pre-placement assessment aims to identify those who may be at higher risk for LBP in a given occupational setting. The main factors that have been investigated include clinical and historical features, physical strength parameters and psychosocial factors. The recurrent nature of LBP means that previous history is the best predictor of future LBP, and all other pre-placement measures have no predictive value at all, or only a weak and unreliable predictive value [8,9,11,14].

B1 *** There is strong evidence that the single, most consistent, predictor of future LBP and work loss is a previous history of LBP, including in particular the frequency and duration of attacks, time since last attack, radiating leg pain, previous surgery and sickness absence due to LBP [14,33].

B2 ** There is moderate evidence that examination findings, including in particular height, weight, lumbar flexibility and straight leg raising (SLR), have little predictive value for future LBP or disability [11,34].

B3 ** There is now moderate evidence that the level of general (cardiorespiratory) fitness has no predictive value for future LBP [11].

B4 * There is limited and contradictory evidence that attempting to match physical capability to job demands may reduce future LBP and work loss [10, 11,33,35].

B5 *** There is strong evidence that X-ray and magnetic resonance imaging (MRI) findings have no predictive value for future LBP or disability [36–43].

B6 *** There is strong evidence that back-function testing machines (isometric, isokinetic or isoinertial measurements) have no predictive value for future LBP or disability [44–47].

B7 *** For symptom-free people, there is strong evidence that individual psychosocial findings are a risk factor for the incidence (onset) of LBP, but overall the size of the effect is small [15,29,48].

High-risk patients/physically demanding jobs

There is a pragmatic argument that individuals at highest risk of LBP should not be placed in jobs that impose the greatest physical demands. The basic concern is that workers with physically (or psychologically) demanding work report rather more low back symptoms, have more work-related back 'injuries' and lose more time off work with LBP. Even if physical demands of work may be a relatively modest factor in the primary causation of LBP (see Background above), people who have LBP (for whatever cause) do have more difficulty managing physically demanding work [15,49]. It may be argued, therefore, that avoiding putting people at highest risk of recurrent LBP and sickness absence into more physically demanding work would be in the interests of the individual worker, the employer and the total societal burden of LBP.

The problem is, a previous history of LBP simply identifies people who are more likely to have recurrent problems, but that has little to do with the job: they are probably likely to have such problems irrespective of which job they are recruited for—and even if they are not recruited [10,14,33]. Indeed, those who remain unemployed may be at highest risk of all for chronic LBP and disability [50]. Because a previous history of LBP is so common, it could exclude many people who are medically fit for most work. At the same time, all pre-placement assessment methods miss many people who may later develop LBP [11]. There is no clear evidence for a threshold of what constitutes a strong history of LBP or excessive job demands [51]. Most of the evidence is from a population-based perspective whilst pre-placement assessment must try to predict future risks for the individual, which is a different matter. It may be concluded that the present evidence base is insufficient for reliable selection of individuals for particular types of work [52]. Attempts to match individual susceptibility for LBP against a risk assessment of the job (and reduction of the risk of injury to the lowest level 'reasonably

practicable') are therefore very much a question of judgement, and there is limited empirical evidence on their effectiveness (B4). Refusal of employment on the basis of such judgements carries substantial personal, societal, legal and political implications, and may need to take into account the requirement under the Disability Discrimination Act 1995 to provide 'suitable and reasonable' adjustments.

C. Prevention

Employers have a statutory and moral responsibility to safeguard the health, safety and welfare of workers, and to take reasonably practicable steps to prevent avoidable injuries. Over the last 50 years, there have been considerable reductions in the physical demands of most work and much effort has gone into ergonomic improvements; this has reduced many serious occupational health risks, but there is inconsistent evidence on whether or to what extent it has reduced occupational LBP. Low back symptoms are common and non-specific, physical demands of work are only one causal factor, and non-occupational and psychosocial issues are important, so it may be questionable to what extent occupational interventions can realistically be expected to reduce the societal impact of LBP. It seems reasonable in principle to attempt to reduce the incidence and prevalence of LBP by interventions designed to reduce known occupational 'risk factors', but the fundamental limitation of this approach may be the lack of any clear causal link (see Background). Much depends on whether the target is reduction of symptoms, 'injuries', sickness absence or long-term disability: different interventions may well have differing effects. There is a lack of convincing evidence that it is possible to reduce the incidence or prevalence of the symptom of LBP substantially. Interventions to reduce physical workload have generally had an inconsistent impact on occupational LBP—when there has been an effect, it remains unclear whether the interventions actually reduced 'symptoms' or 'injuries', or simply modified reporting patterns and altered what workers do about their LBP. Organizational change interventions, directed to improving job satisfaction and psychosocial aspects of work, are difficult to implement and there is conflicting evidence that they have any significant effect on health outcomes (though little of that evidence is specifically about LBP) [7,34,53,54].

C1 * There is contradictory evidence that various general exercise/physical fitness programmes may reduce future LBP and work loss; any effect size appears to be modest [54–59].

C2 *** There is strong evidence that traditional biomedical education based on an injury model does not reduce future LBP and work loss [34,55, 57–60].

C3 – There is preliminary evidence that educational interventions which specifically address beliefs and attitudes may reduce future work loss due to LBP [61].

C4 *** There is strong evidence that lumbar belts or supports do not reduce work-related LBP and work loss [55,57,62].

C5 *** There is strong evidence that low job satisfaction and unsatisfactory psychosocial aspects of work are risk factors for reported LBP, health care use and work loss, but the size of that association is modest [20,21,63,64].

C6 * There is limited evidence but general consensus that joint employer–worker initiatives (generally involving organizational culture and high stakeholder commitment to identify and control occupational risk factors and improve safety, surveillance measures and 'safety culture') can reduce the number of reported back 'injuries' and sickness absences, but there is no clear evidence on the optimum strategies and inconsistent evidence on the effect size [7,53, 58,65–69].

D. Assessment of the worker presenting with back pain

There is general consensus that a simple clinical interview and examination can distinguish between simple back pain manageable at the primary care level and those pathological conditions requiring specialist referral ('red flags'). However, conventional clinical tests of spinal and neurological function are of limited value in determining appropriate clinical or occupational management of non-specific LBP. Furthermore, 'diagnostic labelling' may have detrimental effects on outcome. X-rays and MRI are primarily directed to the investigation of nerve root problems and serious spinal pathology. Much more relevant to occupational health management is the identification of individual and work-related psychosocial issues which form risk factors for chronicity ('yellow flags'). General disaffection with the work situation, attribution of blame, beliefs and attitudes about the relationship between work and symptoms, job dissatisfaction and poor employer–employee relationships may also constitute 'obstacles to recovery' [13,70–73].

D1 ** There is moderate evidence that screening for 'red flags' and diagnostic triage is important to exclude serious spinal diseases and nerve root problems [71].

D2 ** There is moderate evidence that patients who are older (particularly >50 years), have more prolonged and severe symptoms, have radiating leg pain, whose symptoms impact more on activity and work, and who have responded less well to previous therapy are likely to have slower clinical progress,

poorer response to treatment and rehabilitation, and more risk of long-term disability [11,74–80].

D3 ** There is moderate evidence that examination findings, including in particular height, weight, lumbar flexibility and SLR, are of limited value in planning occupational health management or in predicting the prognosis of non-specific LBP [11, 81].

D4 *** There is strong evidence that individual and work-related psychosocial factors play an important role in persisting symptoms and disability, and influence response to treatment and rehabilitation. Screening for 'yellow flags' can help to identify those workers with LBP who are at risk of developing chronic pain and disability. Workers' own beliefs that their LBP was caused by their work and their own expectations about inability to return to work are particularly important [7,10,15,72,80,82–86].

D5 *** There is strong evidence that in patients with non-specific LBP, X-ray and MRI findings do not correlate with clinical symptoms or work capacity [36,87].

E. Management principles for the worker presenting with back pain

Clinical aspects of management should follow the RCGP clinical guidelines [71]. Occupational health management should focus on supporting the worker with LBP and facilitating remaining at work or returning to work as rapidly as possible, and should deal with any occupational issues that may form obstacles to achieving these goals. Occupational health practitioners should liaise closely with primary care health professionals. All stakeholders [i.e. the worker with LBP, supervisor(s) and management, union and health & safety representatives, the occupational health team and other health professionals undertaking clinical management] need to work closely together with a common, consistent approach to agreed goals [69,88–90].

Clinical

E1 *** There is strong evidence that advice to continue ordinary activities of daily living as normally as possible despite the pain can give equivalent or faster symptomatic recovery from the acute symptoms, and leads to shorter periods of work loss, fewer recurrences and less work loss over the following year than 'traditional' medical treatment (advice to rest and 'let pain be your guide' for return to normal activity) [91,92].

E2 ** There is moderate evidence that the above advice can be usefully supplemented by simple educational interventions specifically designed to overcome fear avoidance beliefs and encourage patients to take responsibility for their own self-care [93–95].

Occupational

E3 ** There is moderate evidence that communication, cooperation and common agreed goals between the worker with LBP, the occupational health team, supervisors, management and primary health care professionals is fundamental for improvement in clinical and occupational health management and outcomes [66–69,88–90,96–100].

E4 *** There is strong epidemiological evidence that most workers with LBP are able to continue working or to return to work within a few days or weeks, even if they still have some residual or recurrent symptoms, and that they do not need to wait till they are completely pain free [11,13,14,82,101].

E5 * Advice to continue ordinary activities as normally as possible, in principle, applies equally to work. The scientific evidence confirms that this general approach leads to shorter periods of work loss, fewer recurrences and less work loss over the following year, although most of the evidence comes from intervention packages, and the clinical evidence focusing solely on advice about work is limited [91, 92,101–104].

E6 * There is general consensus but limited scientific evidence that workplace organizational and/or management strategies (generally involving organizational culture and high stakeholder commitment to improve safety, provide optimum case management, and encourage and support early return to work) may reduce absenteeism and duration of work loss [7,13,58,65–67,88–90,96,105–107].

Return to work with back pain

Concern about return to work with residual symptoms is often expressed by workers themselves, their representatives, primary care health professionals and occupational health professionals, as well as supervisors and management, particularly if the LBP is attributed to work and if there is thought to be a risk of 're-injury'. This concern is natural but illogical. A recent study has highlighted the variability in physician advice on return to work and that recommendations often reflect personal attitudes of the physicians and their perception of the severity of symptoms [108]. Studies of the natural history show that LBP is commonly a persistent or recurrent problem, and most workers do continue working or return to work while symptoms are still present [109]: if nobody returned to work till they were 100% symptom free, only a minority would ever return to work (E4). Epidemiological and clinical follow-up studies show that early return to work (or continuing to work) with some

persisting symptoms does not increase the risk of 're-injury' but actually reduces recurrences and sickness absence over the following year (E1). Conversely, the longer someone is off work, the lower the chance of recovery (F1). Undue caution will form an obstacle to return to work and lead to protracted sickness absence, which then aggravates and perpetuates chronic pain and disability, and actually increases the risk of a poor long-term outcome; this clearly is not in the interest of either the worker or the employer. Concerns are also sometimes expressed about legal liability for 're-injury' if the worker returns to work before they are completely 'cured', which is also illogical. Again, the natural history shows that LBP is commonly a persistent or recurrent problem, so expectations of 'cure' are unrealistic and recurrences are likely irrespective of work status. Refusing to allow a worker to return to work because they still have some LBP increases the likelihood of a breakdown in worker–employer relationships and of the worker making a claim; and the longer the sickness absence, the higher the cost of any claim. Helping and supporting the worker to remain at work, or in early return to work, is in principle the most promising means of reducing future symptoms, sickness absence and claims (E1, E5). Reducing any legal liability is best achieved not by forcing the worker into protracted sickness absence and possibly an adversarial situation, but by addressing the issues of job reassessment ('newly assessed duties'), the provision of modified work with adequate support and good worker–employer relationships. All of these goals may best be achieved by the proposed active rehabilitation programme and organizational interventions (F3). That is also more in keeping with the spirit and the requirements of the Disability Discrimination Act [51,69,96,110–114].

F. Management of the worker having difficulty returning to normal occupational duties at ~4–12 weeks

In general, the longer a worker is off work with LBP, the more disabling the condition becomes, the less successful any form of treatment and the greater the probability of long-term sickness absence (F1). This could be explained to some extent by selection bias in that those who are off work longer are simply those with a more severe problem. However, the clinical evidence suggests that there is little if any physical difference in their backs and intervention studies show that there is usually no insurmountable physical barrier to rehabilitation (F3). There are strong logical and humanitarian arguments, and strong empirical evidence, that treatment at the sub-acute stage (~4–12 weeks) is more effective at preventing chronic pain and disability than attempts to treat chronic, intractable pain and disability once it is established (F2). There is strong evidence that intervention packages at the sub-acute stage can produce desirable occupational outcomes (F3), and these efforts are likely to be more cost-effective (though there is only limited empirical evidence on costs and cost-effectiveness). There is therefore a convincing argument for intense efforts to get workers with LBP back to work before disability and sickness absence become protracted [71,115–118].

F1 *** There is strong evidence that the longer a worker is off work with LBP, the lower their chances of ever returning to work. Once a worker is off work for 4–12 weeks they have a 10–40% risk (depending on the setting) of still being off work at 1 year; after 1–2 years absence it is unlikely they will return to any form of work in the foreseeable future, irrespective of further treatment [11,15].

F2 *** Various treatments for chronic LBP may produce some clinical improvement, but there is strong evidence that most clinical interventions are quite ineffective at returning people to work once they have been off work for a protracted period with LBP [116,119,120].

F3 ** There is moderate evidence that for the patient who is having difficulty returning to normal activities at 4–12 weeks, changing the focus from purely symptomatic treatment to a 'back school' type of rehabilitation programme can produce a faster return to work, less chronic disability and less sickness absence. There is no clear evidence on the optimum content or intensity of such packages, but there is generally consistent evidence on certain basic elements (see below). There is moderate evidence that such interventions are more effective in an occupational setting than in a health care setting [121–123].

F4 ** From an organizational perspective, there is moderate evidence that the temporary provision of lighter or modified duties facilitates return to work and reduces time off work [96,110].

F5 – Conversely, there is some suggestion that clinical advice to return only to restricted duties may act as a barrier to return to normal work, particularly if no lighter or modified duties are available [103,104].

(Note: These two evidence statements are not incompatible. The agreed goal should be to return to as near normal duties as possible as rapidly as possible, and clinical advice and management must not undermine that, but the best means of achieving this goal may be by the provision of modified or lighter duties for a limited period.)

F6 ** There is moderate evidence that a combination of optimum clinical management, a rehabilitation programme and organizational interventions

designed to assist the worker with LBP return to work is more effective than single elements alone [69, 88–90,96,97,99,100,113,121,122,124–126].

Rehabilitation programmes

Most of the above principles could be combined in an active rehabilitation programme, although there is wide variation, lack of clear definition and considerable confusion about exactly what constitutes an effective rehabilitation programme. Some forms of 'back school' or 'multidisciplinary rehabilitation' at the sub-acute stage have produced faster recovery of pain and disability, faster return to work and fewer recurrences over the following year than other treatments to which they have been compared (E1, F3). However, the results are inconsistent, probably because most studies are of packages of interventions of widely varying content and intensity. There is no clear evidence on the optimum content or intensity of such packages, although there is generally consistent evidence on certain basic elements.

Education alone is a relatively weak intervention. Traditional biomedical information and advice based on spinal anatomy, biomechanics and an injury model is largely ineffective [127,128], but completely different information and advice, designed to overcome fear avoidance beliefs and promote self-responsibility and self-care, can produce positive shifts in beliefs and reduce disability [93,94,129].

All of the effective rehabilitation programmes have included a progressive active exercise and physical fitness element [121,122]. Such exercise programmes can produce short-term improvement in pain and disability for sub-acute and chronic LBP, although there is no clear evidence that any specific type of exercise has any specific physical effect [130].

There are theoretical considerations and empirical evidence that most of the effective programmes are based on behavioural principles of pain management [15,121], but there are few studies which look at this approach in isolation [131,132]. There is moderate evidence that these programmes are more effective in an occupational setting [121].

The interventions, resources and costs should be strictly controlled. There is insufficient evidence to justify intensive and expensive programmes, and they are likely to be less cost-effective. The rehabilitation programme should be closely audited and evaluated to check that it is effective and not having any unplanned adverse effects.

Evidence gaps in occupational health management of LBP

This review has found considerably more scientific evidence on the occupational health management of LBP than originally anticipated, despite the methodological problems in a workplace setting [6]. There is sufficient evidence to permit a number of strong and moderate evidence statements and recommendations for occupational health management, but this review, however, has also identified inadequacies in the evidence in some important areas.

There is a need for further rigorously designed and carefully controlled studies (where appropriate by randomized controlled trials and with sub-categorization of patients) on:

- Pre-placement assessment, particularly matching (strong) previous history of LBP, physical capabilities and job demands.
- 'Innovative' education approaches to prevention and management specifically designed to overcome psychosocial issues (e.g. fear avoidance beliefs) and encourage patients to take responsibility for their own self-care.
- Company policies on accident prevention, 'safety culture', surveillance and monitoring to reduce reported back 'injuries' and claims.
- The relative benefits and costs of prescribing sick certification for LBP.
- Early interventions to overcome obstacles to recovery (e.g. focused clinical interventions targeting individual 'yellow flags' for chronicity).
- The optimum combination and relative importance of individual components in an active rehabilitation programme.
- The optimum organization, content and combination of case management, active rehabilitation and return to work programmes.

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