# 7 EVIDENCE TABLES

## *Table 1a - Systematic reviews*

| Authors | Date | Subject | Occup. setting | Occup. outcomes | Number of studies | Additional Comments |
|---|---|---|---|---|---|---|
| **Background** | | | | | | |
| (Bongers et al. 1993) | 1993 | Psychosocial risk factors at work | +/- | - | 30 | |
| (NIOSH 1997) | 1997 | Risk factors | + | + | 49 physical<br>13 psychosocial | |
| (Burdorf & Sorock 1997) | 1997 | Occupational and individual risk factors | + | - | 35 | Estimates strength of association |
| (Bigos et al. 1998) | 1998 | Risk factors & primary prevention | + | + | 17 prospective cohort & case control studies risk factors | + 3 RCTs prevention |
| (Vingard & Nachemson 2000) | 1999 | Occupational risk factors | + | - | 41 Physical<br>27 psychosocial | Largely symptoms |
| (Hoogendoorn et al. 1999) | 1999 | Physical load during work and leisure time as risk factors for LBP | + | - | 28 cohort<br>3 case-referent | Largely symptoms |
| (Bovenzi & Hulshof 1999) | 1999 | Whole body vibration | + | - | 17 cross-sectional, longitudinal and case control | Meta-analysis |
| (Davis & Heaney 2000) | 2000 | Psychosocial work characteristics | + | - | 66 psychosocial | Symptoms only. Methodological critique |
| **Prevention** | | | | | | |
| (Lahad et al. 1994) | 1994 | Primary prevention | + | - | 62 studies with original data | Back exercises<br>Educational strategies<br>Lumbar supports |
| (Gebhardt 1994) | 1994 | Training | + | + | 6 | Meta-analysis |
| (Westgaard & Winkel 1997) | 1997 | Ergonomic and workplace interventions | + | + | 20 ergonomic modification<br>32 production system<br>39 secondary prevention | 'Musculoskeletal health' |
| (van Poppel et al. 1997) | 1997 | Primary prevention in industry | + | + | 11 controlled trials | Back exercises<br>Educational strategies<br>Lumbar supports |
| (Ferguson & Marras 1997) | 1997 | Surveillance measures and risk factors | + | + | 57 | |
| (Dishman et al. 1998) | 1998 | Worksite physical activity interventions | + | - | 26 | Outcome: activity level or physical fitness. Not specifically LBP |
| (Polyani et al. 1998) | 1998 | Workplace organisational changes | + | + | 21 case studies | Health outcomes. Not specifically LBP |
| **Assessment of the worker presenting with back pain** | | | | | | |
| (van den Hoogen et al. 1995) | 1995 | Accuracy of history & physical examination | - | - | 36 (cohort studies) | Meta-analysis of sensitivity and specificity |
| (van Tulder et al. 1997) | 1997 | X-rays | - | - | 35 | Meta-analysis |
| (Nachemson & Vingard 2000) | 1999 | MRI | - | - | 14 studies | |

*…….Table 1a (continued)*

| | | | | | | |
|---|---|---|---|---|---|---|
| **Management principles for the worker presenting with back pain** | | | | | | |
| (van Tulder & Waddell 2000) | 1999 | Clinical treatment<br>Acute & subacute LBP | -<br> | +/-<br> | 98 RCTs<br> | SBU In press<br> |
| (Waddell et al. 1997) | 1997 | Bed rest<br>Advice to stay active | -<br>+/- | +/-<br>+/- | 10 RCTs<br>8 RCTs | |
| (Abenhaim et al. 2000) | 1999 | Activity | +/- | +/- | | Systematic review and guideline.<br>Paris Task Force<br>In press |
| (van Tulder et al. 1999) | 1999 | Back schools | +/- | +/- | 15 RCTs | Cochrane review |
| (Faas 1996) | 1996 | Specific back exercises | - | - | 11 RCTs | 4 acute<br>1 sub-acute<br>6 chronic |
| (van Tulder et al. 2000b) | 1999b | Exercise therapy | - | - | 39 RCTs | No conclusions about occupational outcomes |
| (Scheer et al. 1995) | 1995 | Occupational outcomes<br>acute LBP | + | + | 10 RCTs | < 4 weeks duration conservative interventions |
| (van der Weide et al. 1997b) | 1997 | Occupational outcomes | + | + | 40 RCTs | |
| **Management of the worker having difficulty returning to normal occupational duties at approximately 4-12 weeks** | | | | | | |
| (van Tulder et al. 2000a) | 1999c | Clinical treatment<br>chronic LBP | - | - | 96 RCTs | SBU In press |
| (Scheer et al. 1997) | 1997 | Occupational outcomes sub-acute & chronic LBP | + | + | 12 RCTs | Non-surgical interventions |
| (Cutler et al. 1994) | 1994 | Pain centre treatment | +/- | + | 37 cohort studies | Employment outcomes<br>+ meta-analysis |
| (Di Fabio 1995) | 1995 | Comprehensive rehabilitation programmes | +/- | + | 19 RCTs | Meta-analysis |
| (Faucett 1999) | 1999 | Early interventions<br>Acute and sub-chronic LBP | +/- | + | 16 quantitative<br>6 qualitative<br>10 RCTs | |
| (Feuerstein & Zastowny 1999) | 1999 | Multidisciplinary occupational rehabilitation | + | + | 7 controlled studies(1 RCT) | Chronic LBP |
| (Karjalainen et al. 1999) | 1999 | Multidisciplinary rehabilitation | + | + | 12 | Musculoskeletal disorders |
| (Krause et al. 1998) | 1998 | Modified work & return to work | + | + | 29 empirical studies | Few RCTs |

## *Table 1b - Main conclusions of systematic reviews*

* Original authors' main conclusions from Abstract, Results and Discussion. (*Present reviewers' comments in brackets and italics*)

| Systematic review | Subject | Original authors' main conclusions * |
|---|---|---|
| **Background** | | |
| (Bongers et al. 1993) | Psychosocial risk factors at work | The high correlation between psychosocial factors and mechanical loading makes it difficult to draw firm conclusions. Nevertheless, there is evidence that monotonous work, high perceived workload and time pressure, and suggestive evidence that low control on the job and lack of social support are associated with musculoskeletal symptoms. Stress may be an intermediary. |
| (NIOSH 1997) | Risk factors | A large, systematic review considering the epidemiological evidence on risk factors for a wide variety of work-related musculoskeletal disorders, including LBP. It concluded that there is strong evidence for a causal relationship between lifting/forceful movements and whole body vibration and LBP; there is evidence for a causal relationship between awkward postures and heavy physical work and LBP; there is insufficient evidence to assume a causal relationship between static work posture and LBP. It is noted that the association applies when exposures are intense, prolonged and multiple, but it is accepted that the multifactorial origins of LBP may be associated with both work and non-work-related factors. There is increasing evidence that psychosocial aspects of work play a role in the development of LBP, and seem to be independent of physical factors. (This review does not clearly distinguish between incidence, prevalence, injury, chronicity, and work loss, and simply assumes that statistical associations represent a causal relationship. Because of the focus on risk factors as opposed to outcomes, it provides little information on work retention or return-to-work issues where some of these factors may actually be more important.) See also Table 2: National Research Council 1999 |
| (Burdorf & Sorock 1997) | Occupational and individual risk factors | This review aimed to identify important risk factors for work-related back disorders, to present information on the strength of association and estimate their relative contribution to the occurrence of back disorders in occupational populations. Considers physical and psychological factors + certain individual factors. Lifting or carrying loads, whole-body vibration and frequent bending and twisting were found to be consistently associated with back disorders. There were contradictory and generally negative findings on static work postures and repetitive movements. Job dissatisfaction and low decision latitude found to be important, but somewhat inconsistent *(though this review only included a small number of studies on psychosocial aspects of work)*. Age, smoking and education are confounding factors in epidemiological studies. Gender, height, weight, exercise and marital status were found not to be associated with back disorders in occupational populations. |
| (Bigos et al. 1998) | Risk factors & primary prevention | This *(methodologically very rigorous)* review only accepted a limited number of high quality studies: 3 on prevention, 12 retrospective cohort studies and 5 case control studies. The authors concluded that there is insufficient evidence to assess the outcome of specific interventions to prevent back injury or back complaints at work. |
| (Vingard & Nachemson 2000) | Occupational risk factors | Most studies are cross-sectional and concern reports of pain. Nevertheless, the authors concluded that there is a constant but weak relationship between physical work load factors and reports of LBP. The impact of occupation on LBP is modest except for extreme working conditions for prolonged periods without the possibility of changing work tasks. Whole body vibration is a particular risk. Certain psychosocial factors at work also appear to be related to reporting LBP, but most of the studies are cross-sectional, there is confounding with physical work load, and the effect is probably weak. There are theoretical arguments that improving psychosocial aspects of work has the potential for reducing back complaints at work, but at present there is little or no empirical evidence. |
| (Hoogendoorn et al. 1999) | Physical load during work and leisure time as risk factors for LBP | (*This is the most up-to-date and comprehensive review of the effect of physical demands of work.)* There is strong evidence for manual materials handling (lifting, moving, carrying and holding loads), bending and twisting, and whole-body vibration as risk factors for reporting LBP; moderate evidence for patient handling and heavy physical work; contradictory evidence for standing or walking, sitting, sports, and total leisure-time physical activity. |

*…….Table 1b (continued)*

| | | |
|---|---|---|
| (Bovenzi & Hulshof 1999) | Whole body vibration | Occupational exposure to whole body vibration is associated with an increased risk for LBP, sciatic pain and degenerative changes, but the cross-sectional nature of most of the evidence is insufficient to establish a clear exposure-response relationship. |
| (Davis & Heaney 2000) | Psychosocial work characteristics | (This is the most comprehensive and methodologically critical review of psychosocial aspects of work.) There are considerable methodological weaknesses to most studies. Controlling for physical work load significantly weakens the association between psychosocial aspects of work and LBP. In view of the methodological weaknesses it is difficult to draw firm conclusions. Nevertheless, there is strong evidence for a weak relationship between certain psychosocial aspects of work and reported LBP. Workers' reactions to psychosocial aspects of work (e.g. job dissatisfaction and job stress) are more consistently related to reported LBP than psychosocial aspects of work themselves (e.g. work overload, lack of control over work, quality of relationship with co-workers). |
| **Prevention** | | |
| (Lahad et al. 1994) | Primary prevention | Review of four specific interventions. The authors concluded that there is limited evidence that exercises to strengthen back and abdominal muscles and improve physical fitness can reduce the incidence and duration of LBP episodes. They found minimal evidence for educational strategies and insufficient evidence about lumbar supports. There is no evidence for any specific effects from stopping smoking and reducing weight. |
| (Gebhardt 1994) | Training | Meta-analysis of six experimental studies showed that training programmes including education and physical fitness had a statistically significant but modest effect on the incidence and duration of work loss due to LBP. |
| (Westgaard & Winkel 1997) | Ergonomic and workplace interventions | Although this review included 92 studies, they were not strictly ergonomic and very few were RCTs. The most effective interventions were 1) 'organisational culture' using multiple interventions with high stakeholder commitment to reduce identified risk factors, and 2) modifier interventions focussing on workers at risk and using measures which actively involve the individual. However, serious methodological weaknesses mean that there is insufficient scientific evidence to draw any firm conclusions about the impact or effect sizes of these interventions. |
| (van Poppel et al. 1997) | Primary prevention in industry | This review included 11 controlled studies of which 7 were RCTs. 4 out of 5 studies of lumbar supports showed that they were ineffective. 5 out of 6 studies of very varied types of 'education' showed no effect. All three studies of various exercise programmes showed a medium effect. |
| (Ferguson & Marras 1997) | Surveillance measures and risk factors | Surveillance measures fall into four main types (*adapted slightly by the present reviewers*): survey of symptoms; reported injury; incidence surveillance from medical or occupational health records, lost time from work. These different surveillance measures may be viewed as a temporal or severity progression. The authors analysed a wide range of physical and psychosocial risk factors at work against these different surveillance measures, and showed that the findings depended on which surveillance measure was used. As LBP progresses from symptoms to disability, psychosocial (as opposed to physical exposure) factors play a more prominent role. |
| (Dishman et al. 1998) | Worksite physical activity interventions | These interventions are classified as health risk appraisal, health education, behavioural modification or cognitive behavioural programmes, exercise prescription, or combinations of these. Meta-analysis showed that the studies were heterogeneous and the effect size small (r = 0.11) and non-significant. |
| (Polyani et al. 1998) | Workplace organisational changes | Interventions directed to improving job satisfaction and psychosocial aspects of work are difficult and only 4 out of 11 case studies demonstrated any significant effect on worker stress, mental health or absenteeism. (*However, none of that evidence is specifically about LBP.)* |
| (van den Hoogen et al. 1995) | Accuracy of history & physical examination | This is a systematic review of individual items of clinical history and examination, focused mainly on the diagnosis of specific spinal pathologies. It points out the limited reliability and validity of most clinical data. |

*…….Table 1b (continued)*

| | | |
|---|---|---|
| **Assessment of the worker presenting with back pain** | | |
| (van Tulder et al. 1997) | X-rays | There is no firm evidence for a causal relationship between radiographic findings and LBP. There is an association between diagnostic disc degeneration, age and history of LBP, but the relationship is relatively weak and insufficient to make any assessment of the individual patient, and the nature of the evidence does not permit any causal interpretation. There is no relationship between LBP and spondylosis, spondylolysis/spondylolisthesis, spina bifida or transitional vertebrae. Any relationship to Scheuermann changes is inconclusive. This very extensive review only found two prospective studies of the predictive value of plain x-rays (Riihimaki et al 1989, Symmons et al 1991, Table 4). |
| (Vingard & Nachemson 2000) | MRI | High prevalence of abnormal findings in normal asymptomatic subjects. The authors questioned the reliability of routine reporting. MRI findings bear little relationship to past or present clinical symptoms. |
| **Management principles for the worker presenting with back pain** | | |
| (van Tulder & Waddell 2000) | Clinical treatment Acute & subacute LBP | Evidence base for current clinical management as in RCGP (1999) clinical guidelines. Strong evidence for NSAIDs, muscle relaxants, avoiding bed rest and advice to stay active. Conflicting interpretation of evidence on manipulation, (a*lthough most other reviews consider there is strong evidence for manipulation in acute LBP.)* |
| (Waddell et al. 1997) | Bed rest<br><br>Advice to stay active | Bed rest is not an effective treatment for acute LBP but may delay recovery. Advice to stay active and continue normal activities results in faster return to work, less chronic disability and less time off work in the following year. |
| (Abenhaim et al. 2000) | Activity | More extensive discussion of the practical implications of the evidence against bed rest and for advice to maintain or resume normal activities, as far as pain allows. Patients with subacute, intermittent or recurrent LBP should be encouraged to follow an active exercise programme. In principle, recommendations about activities of daily living are equally applicable to return to work, but there is a lack of scientific evidence. |
| (van Tulder et al. 1999) | Back schools | Although this review included 15 RCTs, they were a very heterogeneous group of interventions and the methodological quality was low. The authors concluded that there is moderate evidence that 'back schools' have better short term effects than other treatments for chronic LBP and that there is moderate evidence that 'back schools' in an occupational setting are more effective than placebo or waiting list controls. (The major problem to this review is the difficulty of defining what constitutes a 'back school' and the authors do not attempt to distinguish which elements are associated with successful outcomes.) |
| (Faas 1996) | Back exercises | Only 11 RCTs were included published up to early 1995. In acute LBP specific exercises are ineffective. In sub-acute LBP, there was limited evidence at that time for a graded activity programme. In chronic LBP (>12 weeks), there was some evidence for the short-term efficacy of an intensive exercise programme. |
| (van Tulder et al. 2000b) | Exercise therapy | There is strong evidence that exercise therapy is not effective for acute LBP. There is strong evidence that exercise therapy is more effective than 'usual care' and that exercise therapy and conventional physiotherapy are equally effective for chronic LBP. The authors conclude that exercises may be useful within an active rehabilitation programme if they aim at improving return to normal daily activities and work, but specific back exercises have no clinical effect. |
| (Scheer et al. 1995) | Occupational outcomes acute LBP | Lack of evidence at that time that any treatment was effective in terms of return to work outcomes. |
| (van der Weide et al. 1997b) | Occupational outcomes | 40 RCTs of clinical interventions for all durations of LBP reported vocational outcomes. For acute patients there was limited or moderate evidence that avoiding or restricting the duration of bed rest, and spinal manipulation produced better vocational outcomes. |

*…….Table 1b (continued)*

| **Management of the worker having difficulty returning to normal occupational duties at approximately 4-12 weeks** | | |
|---|---|---|
| (van Tulder et al. 2000a) | Clinical treatment chronic LBP (>12 weeks) | Evidence base for clinical management. There is strong evidence for the effectiveness of manipulation, exercise therapy and multidisciplinary pain treatment programmes, especially with regard to short term effects. There is moderate evidence for behavioural therapy. However, there is a lack of evidence that any treatment has much effect on long-term outcomes or for any effect on the long-term natural history of LBP. |
| (Scheer et al. 1997) | Occupational outcomes sub-acute & chronic LBP | This review included 12 RCTs published by 1993 of non-surgical clinical interventions for sub-acute (4-12 weeks) and chronic (> 12 weeks) LBP which gave vocational outcomes. The authors considered most of the trials had serious methodological weaknesses. 4 trials of various types of exercise therapy and 5 trials of various types of cognitive and behavioural therapy did not provide any clear evidence of any significant effect on vocational outcomes. |
| (Cutler et al. 1994) | Pain centre treatment | This review included 37 studies but very few were RCTs and many were uncontrolled. Meta-analysis showed that a multidisciplinary, functional restoration approach for chronic LBP doubled the number of patients who returned to work. *(However, Teasell & Harth 1996 (T2) pointed out that these authors completely failed to consider the lack of proper controls for these results.)* |
| (Di Fabio 1995) | Comprehensive rehabilitation programmes | This review contrasted 'back schools' as a primary intervention with 'back schools' as part of comprehensive rehabilitation programmes. Meta-analysis showed that back schools coupled with a comprehensive programme were more effective for clinical outcomes of pain, physical impairment and knowledge/compliance. However, disability and vocational outcomes were not significantly better than control groups for either approach. |
| (Faucett 1999) | Early interventions for LBP | (*Comprehensive review of prospective studies of natural history and outcome and of the perspectives of patients with chronic LBP.*) The review included 10 RCTs of a wide range of educational and counselling interventions and considered they 'fall within the scope of nursing practice' *(but did not provide clear conclusions about the evidence.)* |
| (Feuerstein & Zastowny 1999) | Multidisciplinary occupational rehabilitation for chronic LBP and disability | This is a review of multidisciplinary occupational rehabilitation programmes for chronic LBP published 1984-1994. It includes 7 controlled studies but only one of these was an RCT. The mean return to work rate for these interventions was 71% (range 59-85%) compared with 44% for the controls, but the authors point out the lack of proper randomised controls. |
| (Karjalainen et al. 1999) | Multidisciplinary rehabilitation | This is the most recent Cochrane review of multidisciplinary rehabilitation for subacute LBP and various other musculoskeletal disorders. It includes 12 relevant studies but none were high quality RCTs. Two studies were of LBP alone, though most of the others included patients with LBP. The authors concluded that there is moderate evidence for the effectiveness of multidisciplinary rehabilitation for sub-acute LBP for functional outcomes and return to work. *(However, only Lindstrom et al 1992 and Loisel et al 1997 are included in this review.)* |
| (Krause et al. 1998) | Modified work & return to work | This review of 29 empirical studies showed that modified work programmes doubled the number of injured workers who return to work and halved the number of lost work days. 11 studies dealt with LBP alone and another 11 were of all injuries including LBP: the results for LBP appear to be comparable. Most modified work consisted of light duties, although there were also some trials of graded work exposure and work trial periods, and in most studies modified work formed part of a much broader programme. *(There was only one RCT - Loisel et al 1996).* |

## *Table 2 - Narrative reviews*

* Original authors' main conclusions from Abstract, Results and Discussion. (*Present reviewers' comments in brackets and italics*)

| Authors | Original authors' main conclusions * |
|---|---|
| **Background** | |
| (Garg & Moore 1992a) | LBP is an extremely significant cause of disability with major socio-economic impact, but many different personal and job factors are associated with incidence and prevalence of complaints. It is difficult to relate LBP to the workplace because it is common in sedentary as well as heavy physical work, but increased physical demands and heavy lifting, particularly lifting combined with bending and twisting, are associated with more reported LBP and sickness absence. The inherent variability between and within workers precludes assigning risk to any particular individual. |
| (Krause & Ragland 1994) | Proposal of an eight-phase classification of disabling LBP, based on duration of work disability and taking account of other biomedical and social characteristics of work disability resulting from LBP. Prevention of disability requires interdisciplinary approach. |
| (IASP 1995) | Focus on disentangling pain and disability aspects of LBP. Promotes biopsychosocial perspective and time-contingent as opposed to pain-contingent management. |
| (Wilder & Pope 1996) | Review of epidemiological evidence linking whole body vibration exposure and LBP, with discussion of potential aetiological factors. Concludes that there is a clear relationship between whole body vibration environments and LBP. However, the relationship between intrinsically and extrinsically applied mechanical stresses and the accompanying hard and soft tissue deformations (both acute and chronic) requires further definition. |
| (Andersson 1997) | A *(comprehensive and authoritative)* review of the epidemiology of spinal disorders. |
| (Burton 1997) | Biomechanics/psychosocial aspects: Biomechanics/ergonomics related to LBP symptom reports but not to disability and work loss - here psychosocial and work organisational factors dominate; this distinction impacts on strategies for management. |
| (Waddell 1998) | Comprehensive review of the evidence base for the biopsychosocial model and current clinical guidelines. Reproduces the 1996 RCGP and New Zealand guidelines, and 'yellow flags' document. (Chap 5: epidemiology. Chap 6: risk factors. pp 96-7: psychological predictors of LBP. pp 107-112: rate of return to work. pp 113-116: predicting chronicity). |
| (Videman & Battié 1999) | Occupational loading only has a small influence on disc degeneration, and there is no clear dose-response relationship. Twin studies indicate that the combined effect of genes and early childhood environment are more important than occupational exposure. |
| (Dionne 1999) | IASP Epidemiology of pain. Up-to-date, critical review of the epidemiology of adult mechanical LBP. Also concludes that pre-employment selection methods (medical evaluation, strength testing and x-rays) are ineffective and raise ethical and legal questions. |
| (National Research Council 1999) | Work-related musculoskeletal disorders: report of a workshop. There is a strong association between biomechanical stressors at work and reported musculoskeletal pain, injury, loss of work and disability. There is a strong biological plausibility to the relationship between the incidence of musculoskeletal disorders and high-exposure occupations, but methodological weaknesses make it difficult to draw strong causal inferences or to establish the relative importance of task and other factors. Evidence that lower levels of biomechanical stress are associated with musculoskeletal disorders remains less definite. Research clearly demonstrates that reducing the amount of biomechanical stress and interventions which tailor corrective action to individual, organisational and job characteristics can reduce the reported rate of musculoskeletal disorders for workers who perform high-risk tasks. (This review covered all musculoskeletal disorders and there is very little information specifically on LBP.) |
| **Pre-placement assessment** | |
| (Bigos et al. 1992) | Pre-employment screening 13 x-ray studies. X-rays do not predict future back injury claims or chronic disability. (*Most of the studies are actually cross-sectional and not predictive.)* |
| (Newton & Waddell 1993) | Testing with back-function testing machines does not predict future LBP. |

*…….Table 2 (continued)*

| | |
|---|---|
| (Andersson 1997) | *P 114-125 (Comprehensive and authoritative)* review of individual risk factors. Anthropometric or postural measurements, including in particular height, weight or body build, do not correlate strongly with LBP or predict future LBP (although there is conflicting evidence on whether tall subjects are more likely to develop disc prolapse). Four prospective studies considered isometric strength. Two studies (by the same author) found that workers whose job demands approached or exceeded their measured strength were 3x more likely to develop LBP during the following year. One study found that workers whose strength was matched to job demands tended to have fewer complaints during 1 year follow up. One study found that isometric strength did not predict future claims for back injury at work. Three out of four prospective studies showed that cardiovascular fitness did not predict future LBP *(though that is a separate question from whether it influences recovery).* |
| (Andersson & Deyo 1997) | Theoretical analysis of the effect of pre-employment screening. History of LBP alone has low sensitivity and specificity. Because history of LBP is highly correlated with age, 20% of age 30 and 75% of age >50 would be judged 'at risk' of future low back disability, but 75% of future disability would be missed. Positive x-rays calculated to have only 40% predictive value for future work loss. No evidence available on predictive value of static strength tests. |
| (Szpalski & Gunzburg 1998) | Whilst LBP patients have weaker trunk muscles than controls, the results from back-function testing machines have not been shown to have predictive value for future episodes of LBP. |
| **Prevention** | |
| (Garg & Moore 1992b) | Ergonomic job design and job-specific strength testing (related to manual load handling) have potential to identify high-risk workers, but require further validation. |
| (Frank et al. 1996a) | Primary prevention of disability from occupational LBP. A review of the risk factors for the onset of LBP and associated disability. Studies of pre-employment screening, including medical examination, x-rays and strength tests are ineffective in predicting who will develop disabling LBP and 'need to be considered carefully in the context of human rights and employment legislation'. Most forms of workplace interventions attempting to change workers are ineffective, though exercise programmes show some promise. Ergonomic interventions have 'had a difficult time under controlled conditions trying to translate (their) theoretical potential into an observable and reliable reduction in LBP disability'. |
| (Hadler 1997) | Compensable back injuries: distinguish between injury and pain; physical stress only partly explanatory; task context is as important as task content; workplace should be ‘comfortable when we are well and accommodating when we are ill’. |
| (Kaplansky 1998) | Job design/redesign and exercise programmes *may* have a protective effect, but trials are lacking. Evidence does not support use of structured workplace education, back belts or worker selection. |
| (Volinn 1999) | Methodological critique. Whilst some workplace interventions have been reported to be effective in reducing back injuries, methodological problems inherent in pragmatic studies render their results inconclusive. There is suggestive evidence that workplace interventions (of various types) *may* have an effect but explanatory studies are required. |
| **Assessment of the worker presenting with back pain** | |
| (Burton & Main 2000) | This review suggests a paradigm shift from medical concepts of prevention and cure to concentration on removal of obstacles to recovery. In addition to individual psychosocial ‘yellow flags’, it is becoming apparent that work-related factors (‘blue flags’ such as attribution, beliefs about work/injury, disaffection, perceived work demands, work organisation, managerial attitudes, return-to-work policies) are especially important occupational obstacles to recovery. |
| **Management** | |
| (Teasell & Harth 1996) | Functional restoration. This is a highly critical review which points out the serious methodological short-comings of most published trials, including selection bias, lack of proper controls, limitations of outcome measures and inappropriate analysis. The only RCT at that time failed to show any efficacy of such a functional restoration programme. |

*…….Table 2 (continued)*

| | |
|---|---|
| (Hartigan 1996) | This review suggests that patients with acute LBP should be educated that pain is a normal part of recovery, and that activity maintenance improves outcome; some may wish to develop a health-club or home maintenance regimen. Incorporation of direct return to work advice is important, along with direct communication with employer. Successfully managed patients will feel confident about abilities for work and general activities. |
| (Frank et al. 1996b) | Secondary prevention of disability from occupational LBP. A review of the natural history of LBP and the risk factors for chronic disability, as the basis for secondary interventions to reduce the duration of occupational disability. Current clinical guidelines are based on extensive scientific evidence but there is little evidence that the guidelines are implemented or effective. Despite the lack of high quality RCTs, the authors conclude that there is strongly suggestive evidence for several workplace-based interventions. 1) Management retraining to more acceptance and accommodation of LBP, facilitating prompt reporting and treatment, including active rehab services at work, and the provision of modified duties. 2) Pro-active and employee-supported communication between the workplace, injured worker, health care and other involved parties. 3) 'Managed care' to ensure optimum medical treatment and rehabilitation, according to the best scientific evidence and current guidelines. 4) Integration of all these elements in a comprehensive intervention programme in the workplace. |
| (Frank et al. 1998) | Secondary prevention of LBP disability, concentrating on the stage of intervention. Management in the first 3-4 weeks should be conservative according to current clinical guidelines. Interventions at the sub-acute stage (between 3-4 and 12 weeks) should focus on return to work and can reduce time lost from work by 30-50%. There is substantial evidence that appropriately modified work can reduce the duration of work loss by at least 30%. A combination of these approaches in a co-ordinated, guidelines-based and work place-linked care system can reduce sickness absence due to LBP by 50% at no extra cost. |
| (Snook & Webster 1998) | Evidence-based approach to reduction of industrial LBP disability. Focus on co-operation between management and clinicians; training/educating supervisors and workers; concern by supervisors; early treatment access; adaptation of workplace; reduce attribution; pro-active, company-based, early return to work programme. |
| (Nadler et al. 1999) | Sports medicine approach: Prompt evaluation and initiation of treatment, active as opposed to passive rehabilitation and early return to work. Communication with all parties (including case managers under managed care arrangements). |
| (Johanning 2000) | A clinical practice review of occupational low back disorders, with the goal of optimising the quality of care by developing a model of care that integrates medical care with preventive efforts. Concludes that many injuries and pain syndromes are of multifactorial aetiology. Recommends ‘standard ambulatory care’ (and recognition of ‘red flags’). Return to work should be based on thorough understanding of the workplace with control of identifiable risk factors to prevent further injury. Psychosocial factors, work organisational structures, and compensation benefits play an important part in rehabilitation. Occupational health physicians are well placed to be directly involved. |

## *Table 3 - Individual scientific studies*

* Original authors' main conclusions from Abstract, Results and Discussion. (*Present reviewers' comments in brackets and italics*)

| Authors | Type of study | Subject | Original authors' main conclusions * |
|---|---|---|---|
| **Background** | | | |
| (Marras et al. 1993) | Cross-sectional | Biomechanics and epidemiology of LBP | 400+ repetitive industrial lifting jobs categorised as high or low risk from medical/injury records and monitored biomechanically. Combination of 5 trunk motion and workplace factors (lifting frequency, load moment, trunk lateral velocity, trunk twisting velocity, trunk sagittal angle) distinguished between high and low risk. Though not proving causality, an association between biomechanical factors and low back disorder risk was indicated. |
| (Battié et al. 1995) | Retrospective cohort | Spinal degeneration | MRI findings in identical twins showed that the extent of lumbar disc degeneration was explained primarily by genetic and familial influences and age; the influence of physical work load had very modest effects (0-7% of the variance). |
| (Norman et al. 1998) | Case control study | Biomechanical factors | Analysis of exposure to peak and cumulative lumbar loading parameters in LBP cases and controls. Cumulative biomechanical variables stated to be important risk factors in the reporting of LBP. Workers in the top 25% of loading exposure about 6 times more likely to report LBP. *This study concerns reported LBP as opposed to confirmed 'injury' or work loss.* |
| (Brinckmann et al. 1998) | Retrospective cohort | Overload injuries and exposure to physical stressors | Radiological findings show that spinal loading (from heavy physical work and vibration) can result in irreparable overload damage to lumbar discs. However the level of loading required to cause this damage is not likely to be met in modern workplaces. Relationship between damage and symptoms is unclear. |
| **Pre-placement assessment** | | | |
| (Croft et al. 1995) | Prospective population study | Psychological distress | Symptoms of psychological distress in individuals free of LBP predict onset of new episodes during following 12-months. Proportion of new episodes potentially attributable to psychological factors is 16%. |
| (Papageorgiou et al. 1997) | Prospective cohort | Work-related psychosocial factors | People dissatisfied with work are more likely to report LBP for which they do not consult a physician, whilst lower social status and perceived inadequacy of income are independent risk factors for seeking consultation because of LBP during the follow-up year. |
| (Macfarlane et al. 1997) | Prospective cohort | Physical factors related to employment | Occupational activities such as work with heavy objects or long periods of standing or walking were associated with occurrence of LBP in women but not in men. Short-term influences may be more important than cumulative exposure for new episodes. |
| (Adams et al. 1999) | Prospective cohort | Personal risk factors | Previous history of any LBP, personal physical and psychological risk factors were highly significant predictors of 'any' and 'serious' LBP, but only accounted for 12% of the variance in total. Overall, these risk factors were relatively unimportant in the population studied, though they could still be decisive in the individual case. Anthropometric factors, body weight and back strength did not predict. Occupation had little predictive value, though the study was limited by most people being in similar work. |

*…….Table 3 (continued)*

| | | | |
|---|---|---|---|
| (Muller et al. 1999) | 15 year prospective cohort | Influence of previous LBP, previous sick listing and working conditions on future sick listing for LBP | The strongest predictors were previous history of LBP, especially if sciatic pain, analgesics and previous sick listing, and sick listing behaviour in general. Blue collar work was a significant but weaker predictor, and there was an interaction between history of LBP and occupation. |
| (Riihimaki et al. 1989) | 5 year prospective cohort. | Clinical findings<br>X-rays | Previous history of LBP was the best predictor of sciatica. Degenerative changes on initial x-ray did not predict sciatica after adjustment for age. |
| (Symmons et al. 1991a)<br><br>(Symmons et al. 1991b) | 9 year prospective population study of 1009 middle age women | Clinical findings<br><br>X-rays | Degenerative changes on initial x-ray did not predict onset of new LBP in those with no previous history of LBP or recurrent LBP in those with a previous history of LBP. Continuing LBP was not related to deterioration of disc degeneration during follow up. The strongest predictor of progressive degenerative changes was the presence of degeneration at onset, but that was quite separate from symptoms. |
| (Savage et al. 1997) | Prospective cohort | MRI in asymptomatic subjects. | No clear relationship between MRI findings and LBP. MRI findings not related to type of occupation. No change in MRI appearance in those subjects who developed new onset LBP during one year follow up. MRI findings did not predict new LBP on one year follow-up. Authors concluded that MRI is not suitable for pre-employment screening. |
| (Boos et al. 2000) | Prospective cohort | MRI in selected asymptomatic subjects with MRI abnormalities. | MRI findings did not predict significant new LBP or sciatica or work absence or medical consultation with 5 year follow-up. |
| (Borenstein et al. 1998) | Prospective cohort | MRI in asymptomatic subjects. | MRI did not predict significant new LBP or sciatica on 7 year follow-up. |
| (Mostardi et al. 1992) | Prospective cohort | Isokinetic lifting strength of high-risk nurses. | Did not predict LBP or back injury on 2 year follow-up. |
| (Newton et al. 1993) | Prospective cohort | Cybex isokinetic assessment of normal subjects. | Did not predict new LBP on 2.5 year follow-up. |
| (Dueker et al. 1994) | Prospective cohort | LIDO isokinetic trunk testing of job applicants | No significant difference in initial isokinetic scores of workers who had occupational low back injury over 6 year follow-up. |
| (Masset et al. 1998) | Prospective cohort | Isostation B200 isoinertial trunk testing of workers with no previous history of LBP. | Workers with history of LBP performed tests at lower velocity, but probability for development of LBP in following year greater for those performing tests at greater velocities. *(Contrary to the author's own conclusions, the results showed no consistent relationship between isoinertial performance and new LBP on 2 year follow-up.)* |
| **Prevention** | | | |
| (Hunt & Habeck 1993) | Cross-sectional | Study of employer policies and practices. | (The Michigan Disability Prevention Study) Safety diligence, Pro-active return to work programmes, and Safety training and Active safety leadership are associated with significantly fewer days off work. Ergonomic interventions and Wellness orientation did not have significant effects, while Disability case monitoring could be counter-productive. |

*…….Table 3 (continued)*

| | | | |
|---|---|---|---|
| (Shannon et al. 1996) | Cross-sectional survey of 718 workplaces | Study of employer policies and practices. | Fewer lost-time WCB claims (all injuries) were associated with: concrete demonstration by management of its concern for the workforce; greater involvement of workers in company decision making; greater willingness of the Health & Safety Committee to solve problems internally; and an older, more stable, more experienced workforce. |
| (Symonds et al. 1995) | Controlled trial | Trial of educational pamphlet in industry | An educational pamphlet produced a positive shift in beliefs about LBP that was accompanied by a concomitant reduction in 'extended' absence related to LBP. The pamphlet intended to reduce fears about LBP and advised on longer-term advantages from work retention and early return to work. |
| (Daltroy et al. 1997) | RCT | Primary prevention - back school | This RCT in 4000 postal workers showed that a back school had no effect on low back injuries during 5.5 years follow-up. |
| (van Poppel et al. 1998) | RCT | Lumbar supports for primary prevention. | Lumbar supports and/or instruction on lifting techniques did not reduce incidence of LBP or absence. |
| (Ostry et al. 1999) | Cross-sectional | Study of workplace organisation. | Manager's assessment of high staff job satisfaction and senior management's review of health and safety performance; and labour's assessment of the involvement of senior management, supervisors and line employees in safety inspections and the availability of job retraining for injured workers; were associated with lower company claim rates. |
| **Assessment of the worker presenting with back pain** | | | |
| (Cheadle et al. 1994) | Cohort study | Predictors of duration of work loss in 28,473 US WCB injuries | Even after adjusting for severity of injury, older age, female gender and back strains were associated with longer time off. Heavier work and smaller firms also had a significant but weaker effect. The authors recommend that disability prevention efforts should be directed to those at higher risk. |
| (Abenhaim et al. 1995) | Prospective cohort study | Diagnostic labelling | Physicians' making of 'specific' initial diagnoses such as sciatica, disc lesions, facet joint syndrome or osteoarthritis (without any independent verification of pathology) was highly associated with the risk of chronic disability at 6 months compared with 'non-specific' diagnoses of pain, sprains or strains . This was partly a question of case mix, but also reflected the effect of 'labelling'. |
| (Oleinick et al. 1996) | Cohort study | Predictors of acute (< 8 weeks) and chronic (> 8 weeks) work loss in 8628 US WCB claimants with back injuries followed for 6 years. | Different predictors at acute and chronic stages. For both acute and chronic disability the most important predictor was increasing age, particularly over age 55 years. Smaller companies also had higher risk of chronic disability. The authors conclude that management strategies may need to vary at different ages and that new strategies are required to encourage small and medium size companies to help injured workers return to work and earlier. |

*…….Table 3 (continued)*

| | | | |
|---|---|---|---|
| (Baldwin et al. 1996) | Cohort study | Ontario WCB survey of workers with permanent impairment followed for 17 years. | Initial return to work was less likely with back strains, increasing age, unmarried men and married women, lower education, and various socio-economic factors. However, although 85% did initially return to work, more than half then had further absences. In a second analysis of long-term work patterns, 21% had further absences before successfully continued working, and 11% had further absences before giving up work. Further absences and eventually giving up work were most likely in those with back injuries, increasing age, less education and various socio-economic factors. The authors conclude that personal and socio-demographic factors are more important than biomedical factors in determining occupational outcome. Employers' accommodations of reduced hours and light work were associated with fewer further absences and more successful work retention. |
| (Infante-Rivarde & Lortie 1997) | Cohort study | Relapse and absence in first episode of compensated LBP | Incidence of relapse or short sickness absence in first six months after return to work was predicted only by overall pain and pain associated with carrying out simple daily movements assessed at discharge (socio-demographic, clinical features and workers' views were not predictive). |
| (Ingermarsson et al. 1997) | Clinical cohort study | Predictors of duration of work loss. | In workers with sub-acute LBP (4-8 weeks off work), the best predictor of sickness absence over the next year was total sickness absence in the previous year. |
| (Lehmann et al. 1993) | Clinical cohort study | Predictors of duration of work loss. | In workers with sub-acute LBP (2-6 weeks off work), the best predictors of chronic incapacity at 6 months were perception that LBP was work-related and absence duration |
| (Hazard et al. 1997) | RCT | Early physician notification and guidelines | A predictive questionnaire successfully identified patients at high risk of developing work absence at 3 months, but early physician referral and clinical guidance did not produce any significant improvement in pain, return to work or satisfaction with care. |
| (Nordin et al. 1997) | Cohort study | Prospective – workers with lost-work episode of LBP | Model Clinic approach. Comprehensive clinical examination and assessment of psychosocial factors within 1-week of lost-work time. Multivariate model for prediction of delayed return to work (> 1 month) included physical, behavioural and job factors, and supported the biopsychosocial model of LBP. Biopsychosocial factors (yellow flags) should be considered at onset of injury. |
| (Haldorsen et al. 1998) | Cohort study | Predictors of failure to return to work within 12 months | Patients sick listed for 8-12 weeks entered a light mobilisation programme that encouraged them to be active participants in management. Low benefit from the programme was predicted by low internal health locus of control, restricted lateral mobility and reduced work ability. |
| **Management principles for the worker presenting with back pain** | | | |
| (Vroomen et al. 1999) | RCT | Bed rest for disc prolapse and sciatica | Bed rest is no more effective than watchful waiting. |
| (Roland & Dixon 1989) | RCT | Trial of a traditional educational booklet in primary care. | The booklet produced significant improvement in knowledge and significantly fewer repeat consultations with LBP, but made no difference to days off work over the next year. |
| (Cherkin et al. 1996) | RCT | Trial of a traditional educational booklet | A traditional educational booklet had no significant effect compared with 'usual care'. An individual educational session with a practice nurse produced greater knowledge and patient satisfaction but did not influence clinical outcomes. |

*…….Table 3 (continued)*

| | | | |
|---|---|---|---|
| (Burton et al. 1999) | RCT | Trial of a novel educational booklet in primary care | Primary care delivery of an educational booklet that specifically addresses fear avoidance beliefs by giving positive messages about prognosis, activity and work retention produced a positive shift in beliefs and short-tem reduction in disability. |
| (Moore et al. 2000) | RCT | Educational programme in primary care. | A brief cognitive-behavioural intervention designed to provide accurate information, reduce fears and worries, encourage self care and improve functional outcomes produced significant improvement in worries, fear-avoidance, pain intensity and function, and more favourable attitudes about self care. |
| (Pfingsten et al. 2000) | RCT | Experimental study in patients with chronic LBP | Inducing pain anticipation produced increased pain intensity, anxiety and fear-avoidance beliefs, and poorer performance during a non-provocative physical performance test. Reassurance produced the opposite effects. |
| **Management of the worker having difficulty returning to normal occupational duties at approximately 4-12 weeks** | | | |
| (Greenwood et al. 1990) | RCT | Coal miners within 2 weeks of back injury. | Early intervention, case management approach. Patients with psychosocial risk factors seen by nurse and counsellor who offered guidance, co-ordinated their primary and specialist care and physiotherapy, and if necessary arranged psychological services. No difference in time off work but increased medical costs in the early intervention group. |
| (Mitchell & Carmen 1990) | RCT | Trial of functional restoration for LBP 3-6 months off work. | 79% of functional restoration patients working at 1 year compared with 78% of controls. |
| (Jarvikoski et al. 1993) | Prospective trial: | Quasi-experimental comparison of multi-modal treatment programmes | Intensive training with ‘no pain, no gain’ rationale produced greater improvement in pain and functional capacity, but did not decrease absence compared with the less intensive programme. Suggests more active interventions addressing work and work-life are needed. |
| (Alaranta et al. 1994) | RCT | Trial of functional restoration | Functional restoration improved range of movement, muscle strength and endurance but these effects fell off by 12 months. Functional restoration improved self-reported performance and disability. However. there was no difference in sick leave over the next year between the functional restoration group and controls. |
| (Loisel et al. 1997) | RCT | Trial of a model of management for sub-acute LBP (>4-6 weeks off work) | This was a population-based trial of a highly organised system involving close co-operation between the injured worker, supervisor, and labour and management representatives. The occupational intervention started with assessments by an occupational health physician and an ergonomist. All of the parties then visited the work site to observe the worker's tasks, reach an 'ergonomic diagnosis' and prescribe specific improvements in work tasks, all directed to stable return to work. The clinical intervention consisted of a visit to a back specialist and a back school, followed by a multidisciplinary functional restoration rehabilitation programme if still off work at 12 weeks. The combination of the clinical and occupational interventions produced 2.4x faster return to regular work than usual care. The occupational part of the intervention had the larger impact. |
| (Ljunggren et al. 1997) | RCT | Physiotherapy patients | Supervised motivated exercise programme -v- exercise on their own. Absenteeism reduced similarly in both groups in the second year; no effect from supervised programme. |

***…….Table 3 (continued)***

| | | | |
|---|---|---|---|
| (Bendix et al. 1998a) (Bendix et al. 1998b) | Two separate RCTs | Two trials of functional restoration for chronic LBP with > 6 months disability | The first RCT showed that an intensive functional restoration programme produced significantly fewer sick days and contacts with the health care system than untreated controls. The second RCT showed that the intensive functional restoration programme produced a significantly higher proportion returning to work and significantly fewer sick leave days than a less intensive control programme. These effects were maintained at 2 and 5 years. |
| (Frost et al. 1998) | RCT | Trial of a fitness programme for chronic LBP | An 8 session physical fitness programme over 4 weeks was based on a sports medicine approach and cognitive behavioural principles. This fitness programme combined with an educational back school produced significantly lower self-reported disability at 2 years compared with the back school alone. |
| (Friedrich et al. 1998) | RCT | Trial of a combined exercise and motivation programme with a standard physiotherapy exercise programme | The motivation group had higher short term compliance and significantly less pain and self-reported disability at one year, but long-term exercise compliance was no different. 20% more of the compliance group returned to their previous level of work by 4 months, which was of borderline significance. |
| (Lonn et al. 1999) | RCT | Trial of an active back school | Intensive, active back school of 20 sessions over 3 months significantly reduced the frequency and severity of recurrences over 1 year follow-up. |
| (Klaber-Moffett et al. 1999) | RCT | Trial of exercise programme with cognitive behavioural component in primary care | Exercise programme produced significantly greater improvement in Roland disability scale at 6 and 12 months. Days off work during 12 month follow up was reduced by 30% but this did not reach statistical significance. |
| (Kankaanpaa et al. 1999) | RCT | Trial of active rehabilitation for chronic LBP | Active, progressive rehabilitation significantly reduced pain and self reported disability and improved lumbar endurance compared with passive control treatment, although group differences in endurance diminished by 1 year. |

## *Table 4 – Additional studies on work retention and return to work.*

* Original authors' main conclusions from Abstract, Results and Discussion. (*Present reviewers' comments in brackets and italics*)

| Authors | Subject | Original authors' main conclusions * |
|---|---|---|
| **Assessment of the worker presenting with back pain** | | |
| (Sandstrom & Esbjornsson 1986) | Prospective - rehabilitation programme | Patients' own estimate of their ability to return to work before they undertook a rehabilitation programme was the best predictor of actual return to work after rehabilitation. The rehabilitation process seemed to have marginal influence on outcome in patients with clearly expressed negative attitudes. |
| (Lancourt & Kettelhut 1992) | Prospective – workers with LBP | Nonorganic factors are better predictors of return to work than organic findings. X-ray, myelogram and CT findings did not predict time off work. Length of time off work was highly predictive. Different factors important at different stages. For < 6 months the important predictors were high disability score, leg pain, short tenure on job and examination findings of illness behaviour. For > 6 months off these were not predictive but previous injuries and stability of family living arrangements were. |
| (Carosella et al. 1994) | Prospective - intensive rehab programme | Patients' own beliefs about return to work were best predictor of dropping out of rehab programme, better than severity of pain, duration of time off work or perception of work. |
| (Fishbain et al. 1997) | Prospective – chronic pain patients | Multidisciplinary pain centre patients questioned on job perceptions and 'intent' to return to work. There was an association between pre-injury job perceptions and actual return to work. The patient's own assessment before treatment of inability to return to work was highly predictive of not returning to work after the treatment. |
| (Devereux et al. 1999) | Cross-sectional study | Looked at physical and psychosocial risk factors in a high-high, high-low, low-high, low-low exposure groups and compared with self-reports of LBP. Suggests an interaction between physical and psychosocial risk factors at work may exist to increase the risk of self-reported back disorders. Suggests ergonomic interventions should not only focus on physical but also on psychosocial factors at work. |
| **Management of the worker presenting with back pain** | | |
| (Catchlove & Cohen 1982) | Retrospective – compensation patients | Comparison of two groups attending a pain Management Unit. Patients in one group were positively instructed to return to work as an integral part of the treatment programme (rather than being the goal of treatment). Significantly more of this group (60% *v* 25%) returned to work, and at 10-month follow-up 90% were still at work and received less treatment. |
| (Hiebert et al. 2000) | Historical cohort | Prescription of work restrictions by the occupational health physician made no difference to duration of work loss. Work restrictions remained in place for longer than physiological healing time. Prescription of work restrictions was associated with reduced chance of return to original work in next 12-months. *(There was no significant difference in the risk of recurrence: i.e. prescription of work restrictions did not reduce the risk of 're-injury').* |
| (Hall et al. 1994) | Prospective – comparing two recommendations about return to unrestricted work | Therapists' advice on return to restricted or unrestricted duties is usually based on patients' reports of pain or therapists' unfounded fears that return to work would result in harm. During the first phase of this study (control) the therapist accepted pain as a reason for advising half the patients to return to restricted work only. In the second, study phase most patients were advised to return to normal work, irrespective of pain. Advice to return to normal work doubled the number who returned to normal duty, while patients advised about restricted duties were less likely ever to return to normal duties. |
| (Wiesel et al. 1994) | Prospective 10-year study of management protocol for LBP. | Evidence based, standardised diagnostic and treatment protocols and independent specialist monitoring produced 50% fall in new injuries, 40% fall in average days off, and total 55% fall in days lost from work. |

*…….Table 4 (continued)*

| | | |
|---|---|---|
| (Nassau 1999) | 10.5 year retrospective study - hospital employees. | Integrated programme of pre-employment screening for at-risk jobs, close case management, early return to work policy and availability of modified work. In general, the injury rate did not change but the average duration of work loss fell slightly from 4.5 to 3.8 days. However, there was a dramatic and highly significant reduction in the injury rate and average number of lost work days among those workers screened. |
| (van der Weide et al. 1999) | Cohort study | Assessed implementation of OH guidelines (see van der Weide et al 1997 – Table 5) using criteria for physician compliance. If guidelines are met, then outcome is better (working status at 3 months and time lost). If patients attributed their LBP to work they were less satisfied with the intervention by the physician, but overall satisfaction with health care was not related to work outcomes. |
| **Management of the worker having difficulty returning to normal occupational duties at approximately 4-12 weeks** | | |
| (Wood 1987) | Prospective - nursing workforce | A Personnel Programme (hospital-wide effort to increase communication between claimants, doctors, compensation board and the employer, including in particular the worker's supervisor phoning to say: 'How are you? We are thinking about you. You are a vital part of the team. Your work is important and your job is waiting for you.') cut the number who stayed off long-term with back injuries from 7.1% to 1.7% A Back Programme (intensive feedback training on patient handling) did not significantly reduce back injuries. |
| (Haig et al. 1990) | Prospective hospital workers<br><br>Historical controls | Aggressive early management by a specialist in physical medicine who evaluated employees at 2 days off work and delivered standard treatment more efficiently. Overall, this significantly reduced the duration of work loss, but for LBP only from an average of 8.8 to 7.5 days. |
| (Ryan et al. 1995) | Prospective - miners | A back pain programme was instituted comprising workforce education, early injury reporting, first aid at workplace, changing workplace psychosocial perceptions and involvement of management and employees. Compared with another mine, the programme significantly reduced the number of claims and costs per claim. |
| (van Doorn 1995) | Prospective - self-employed health professionals claiming insurance. | An early intervention programme delivered by an insurance physician reduced mean and cumulative LBP disability, and recurrence. A time-dependant approach involved mutual trust between physician and claimant, and focused on advice on active rehabilitation and early gradual return to work. Part-time or limited duties were always possible, but pain was not a reason for recommending this. |
| (Yassi et al. 1995) | Prospective - nurses | Compared with pre-programme data and control wards, an early intervention programme in 10 high risk wards (comprising prompt assessment, treatment and rehabilitation through modified work) reduced the number of reported back injuries by 23% and lost-time back injuries by 43%; intervention was cost-beneficial. |
| (Garcy et al. 1996) | Prospective – chronic LBP | Assessed incidence of claimed recurrence after functional restoration. Even for this sample of severe chronic disabling LBP patients, who completed a tertiary prevention programme, a relatively low risk for either recurrence was found. Neither physical nor psychological risk factors for recurrence could be found. Findings argue against employer bias in not rehiring employees with previous chronic LBP, or discrimination in pre- or re-employment on the basis of putative risk of re-injury after appropriate rehabilitation programme. |
| (Ehrmann-Feldman et al. 1996) | Prospective – compensation cases | Data collected from workers' compensation records of 2,147 LBP claimants. Of patients referred for physical therapy, those referred earlier tended to return to work sooner than those referred later.<br><br>(*But no allowance for case mix or selection bias.*) |

***…….Table 4 (continued)***

| | | |
|---|---|---|
| (Burton et al. 1996) | Retrospective – police officers | Following first reported episode of LBP 8% of police officers changed duties (5% moved to heavier work; 3% to lighter work). Most returned to their previous tasks, many of which entailed hazards identified for first time LBP. Persistence at the same work was not related to persistence of symptoms over 6 years following onset. Attribution of LBP to police work and psychological distress were associated with work loss. |
| (Sinclair et al. 1997) | Prospective – workers absent with LBP | Large scale follow-up of Mitchell & Carmen 1990 (see Table 3). 1 year follow up of 2000 injured workers on an early, intensive rehab programme. Programme made no difference to pain, disability or quality of life but increased average duration of work loss by 7 days, attributed to too early intervention when many patients would have recovered anyway, keeping workers off work to attend the programme, and administrative stopping of communication between rehab physicians and the workplace. |
| (Tate et al. 1999) | Prospective – cohort of nurses | Back injured nurses targeted for workplace early intervention. Time loss due to LBP during 6 months after back injury analysed. Perceived disability was related to whether time loss would ensue. Self-reported pain strongly associated with duration of time loss once injury had become a time loss injury. Injury while lifting patients resulted in greater time loss. Participation in the return-to-work programme (including modified duties) reduced the duration of work loss. Focusing on reducing perception of disability at time of injury was considered critical to preventing time loss, but once time loss occurred, offer of modified work and attention to pain reduction were said to be warranted. |
| (Wigley et al. 1990) | Early *v* late functional restoration programme | Two cohorts entered the programme < 6 months or > 6 months from injury. Those treated earlier achieved greater gains in functional performance ($VO_2$ max, spinal flexion, lifting capacity). |

## *Table 5 – Previous guidelines*

| **Title/Source** | **Country** | **Main focus and recommendations** *(Summarised by present reviewers)* |
|---|---|---|
| **Clinical** | | |
| Clinical Practice Guideline: Acute low back problems in adults.<br><br>(Agency for Health Care Policy and Research. 1994) | USA | The first modern, evidence-based and –linked, clinical guideline for the management of LBP. Diagnostic triage and 'red flags'. Limited evidence for most therapies. Bed rest >4 days is not helpful and may be debilitating. Activity modification during acute LBP and then as recovering encourage to return to work and to normal activities as soon as possible. Psychological and socio-economic factors may be addressed. |
| Report on back pain.<br><br>(Clinical Standards Advisory Group. 1994) | UK | Report on present and future NHS services for LBP. First UK clinical guidelines with algorithms on diagnostic triage and primary care management of non-specific LBP. Advice on staying active and return to work. Need for biopsychosocial assessment at 6 weeks and the development of dedicated services and multidisciplinary rehab services for patients with non-specific LBP. |
| Counselling to prevent low back pain.<br><br>National Guideline Clearing House<br><br>(US Preventive Services Task Force 1996) | USA | Evidence linked recommendations on advice that may be given to prevent LBP. Insufficient evidence to recommend for or against counselling on exercise, educational intervention, back belts, risk factor modification, obesity, smoking. |
| Guidelines for the management of employees with compensable low back pain.<br><br>(Victorian Workcover Authority. 1996) | Australia | Assessment and clinical management of workers with compensable LBP to prevent disability. Advocates active management, advice and early return to work |
| New Zealand acute low back pain guide.<br><br>ACC/National Advisory Committee on Health and Disability<br><br>(ACC and the National Health Committee 1997) | New Zealand | Evidence based approach to assessment and treatment of acute LBP with a view to preventing chronicity and disability. Active management approach against suggested time frames with declared intention to change attitudes of clinicians and patients. |
| Guide to assessing psychosocial yellow flags in acute low back pain.<br><br>ACC / National Advisory Committee on Health and Disability<br><br>(Kendall et al. 1997) | New Zealand | Assessment of psychosocial factors that are likely to increase the risk of chronicity in acute LBP. Screening for psychosocial factors and strategies for better management of those at risk. Active management and advice to reduce distress. |
| Health Care Guideline: adult low back pain.<br><br>Institute for Clinical Systems Integration<br><br>(ICSI 1998) | USA | *Update of AHCPR (1994).* Evidence based assessment protocols and treatment plans. Time contingent management. Continuance of activity (rather than rest); reassurance; educational leaflet; medication; self-care; physical therapy. Comprehensive re-evaluation at 6-weeks; then rehabilitation/exercise therapy. |

*…….Table 5 (continued)*

| | | |
|---|---|---|
| Clinical guidelines for the management of acute low back pain.<br><br>Royal College of General Practitioners<br><br>(Royal College of General Practitioners 1999) | UK | Evidence-linked guidance on assessment and treatment of acute LBP in primary care. Diagnostic triage; medication to control pain; avoid bed rest; promote activity; maintain/resume work; consider manipulation; rehabilitation if not active at 6-weeks. |
| Paris Task Force.<br><br>The role of activity in the therapeutic management of back pain.<br><br>((Abenhaim et al. 2000)<br><br>(also listed in systemic reviews; Table 1) | France | Extensive discussion of the practical implications of the evidence against bed rest and for advice to maintain or resume normal activities, as far as pain allows. Patients with sub-acute intermittent or recurrent LBP should be encouraged to follow an active exercise programme. Theoretically, recommendations about activities of daily living appear applicable to return to work, but in view of the lack of scientific evidence the Task Force authorised rather than recommended return to work. |
| **Occupational** | | |
| Supervisor's Handbook: Supervising to prevent and manage back injuries.<br><br>The Saunders Group Inc<br><br>(Pollock et al. 1991)<br><br>*(still being distributed in UK by BackCare)* | USA | *Didactic and not evidence based.* Emphasises the importance of communication with and involvement of workers in back injury prevention. Management must be actively involved in claims control and management, with the aim of returning the injured worker to work as soon as possible. Detailed sequence of claims management programme. Supervisors should:<br><br>Educate workers about back care and set standards.<br><br>Supervise use of proper body mechanics.<br><br>Be involved in work site evaluation, modification and redesign.<br><br>Encourage team work and use of lifting devices.<br><br>Require use of proper safety clothing and equipment.<br><br>Design jobs to minimise size and bulk of loads, minimise reach and distance to be moved, and allow sufficient time.<br><br>Return injured worker to work as soon as possible. |
| (Westgaard & Winkel 1996)<br><br>*(systematic review)* | - | A systematic review of guidelines for occupational musculoskeletal load. Present guidelines are only based on laboratory studies aiming to reduce short-term physiological or psychological effects. Most guidelines are directed to the level of work load rather than the repetitions or duration of work load. There is little or no empirical evidence on the effectiveness of any of these guidelines. The authors conclude that current guidelines are inadequate and may be misleading. |
| Occupational Medicine Practice Guidelines.<br><br>(Harris 1997) | USA | Assessment and treatment of potentially work-related acute and sub-acute LBP. *Largely a reproduction of AHCPR (1994)* with a few supplementary comments on occupational health issues which are not evidence based or linked. Generally avoid bed rest; promote activity and/or job modification; promote exercise; early return to work; investigate and address psychosocial, workplace or socio-economic factors. |
| Guidelines on work site prevention of low back pain.<br><br>Labour Standards Bureau<br><br>(Yamamoto 1997) | Japan | Un-referenced guidance on work site prevention through ergonomic factors; work organisation; pre-placement examinations; education; manual handling. Advice on handling, accommodation, sitting, pre-work and at-work exercises. |

*…….Table 5 (continued)*

| | | |
|---|---|---|
| The physician's role in helping patients return to work after an illness or injury.<br><br>Canadian Medical Association<br><br>(Kazimirski 1997) | Canada | Policy statement addressing the clinician's role. Highlights communication between patient and employer for early treatment and return to work; importance of addressing obstacles to recovery; developing modified work plan; recognition of employees' family and workplace roles; importance of employer-employee relationship in return to work. |
| (van der Weide et al. 1997a)<br><br>*(guidelines audit)* | Netherlands | Guidelines for occupational LBP rehabilitation developed. Intervention between 2 and 4 weeks. Diagnostic triage, match abilities/demands, co-operation from 'relevant others' – treatment/management with focus on barriers to early return to work. Authors recommend use of guidelines with recording of physician 'performance' of guideline principles. |
| Practice guidelines for occupational physicians: workers with low-back pain.<br><br>(Aulman et al. 1999) | Netherlands | Adaptation of Dutch clinical guideline for occupational physicians, evidence based but not evidence linked. Target - workers off sick with LBP. Aim - to prevent unnecessarily long sickness absence and chronic disability. Assessment includes psychosocial problems, illness behaviour, experience of disabilities, adequacy of treatment, work environment & psychosocial factors, fitness for work. For non-specific LBP, advice includes reassurance about the good prognosis and the importance of maintaining usual activities. If no further problems, return to work within two weeks, if necessary conferring with the treating physician, and providing temporary adaptations in working hours or tasks and psychological support. If problems: re-evaluate within two weeks. If no progress within two weeks: refer to a graded activity programme. If no progress within 12 weeks: refer to a rehabilitation or back care centre. |
| Low back pain at the workplace: risk factors and prevention.<br><br>(INSERM 2000) | France | Expert literature synthesis (*rather than a systematic review*). Risk factors generally consistent with other reviews. Recommendations include disseminating information ('The Back Book' (Anon 1996)), better surveillance, better follow-up and advice to those at risk of chronicity. Early prevention: awareness campaigns, joint worker-management campaigns to reduce occupational risks and improve organisational aspects of work, and general safety training rather than specifically on LBP. Prevention of chronicity: evaluate workers off sick for 4 weeks with LBP and develop combined health care and occupational interventions. Proposed pilot project and evaluation of a rehab programme for chronic LBP. |
| (Poole 1999) | UK | Describes a pre-placement health assessment to classify high, medium and low risk for future sickness absence. Includes LBP and aspects of its previous history. *(This is a personal, untested view and is not based on a systematic review.)* |