Pain and work: a short review

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Abstract
Introduction
Pain and work are related in a number of ways. This brief review aims to provide an introduction, by means of illustrative examples from the literature, to four aspects of pain and work that are relevant to those involved with managing pain: work causing pain, pain interfering with work, the impact of pain treatment on work-related outcomes and interventions for the treatment and prevention of pain that can be performed at the workplace.

Discussion
It is well known that damage to the musculoskeletal apparatus as it may occur during occupational accidents or as a result of occupational diseases may lead to chronic painful states. Psychological factors at the job may also have an impact on pain perception. Painful conditions, including those due to musculoskeletal pain, lead to substantial loss of time at work and productivity.

Conclusion
It is perhaps less well known that work-related outcomes may inform about treatment success, also in the context of clinical trials, and that they may be of use in validating the responder outcomes that are now often used in pain trials. The evidence base for workplace-related interventions for preventing and treating painful conditions is weak.

Introduction
Pain and work are related in a number of ways: first, work may cause pain; second, pain may interfere with work and result in lost productivity; third, returning to work after pain treatment is an outcome by which to judge treatment success, and it may be a useful outcome in clinical trials and, fourth, the workplace may provide an environment for performing interventions with the aim of preventing or treating painful conditions. The first two points are well known and generally appreciated. The third and fourth points perhaps deserve more attention. This review aims to provide an introduction to these four aspects relating to pain and work.

Work causing pain
That acute pain may result from occupational accidents or unusual strains experienced at the workplace hardly deserves special mention. Chronic painful musculoskeletal conditions may be work related, too, sometimes with a clearly identifiable cause. Common examples of damage caused by hand-held vibrating tools include damage to the intervertebral discs in the lumbar spine that can result from heavy lifting or whole-body vibration, meniscus damage as well as osteoarthritis of the knee that may result from kneeling or other work, which similarly strains the knees and damages the bony structures in the upper limb. Whether a given condition is recognised as an occupational disease may differ between jurisdictions. The above-mentioned examples are among the conditions that are recognised as occupational diseases in Germany. Recent evidence adds to the established work-related causes of painful conditions; for example, manual work involving prolonged and highly repetitive flexion and extension of the wrist and the use of hand-held vibratory tools have been linked with carpal tunnel syndrome.

The relationship between the job and experience of pain can be more subtle; however, psychological factors may be important. Often there is a work-related aspect to painful conditions even if they are not recognised as occupational diseases. For example, a systematic review found that the lack of social support in the workplace and job dissatisfaction were associated with lower back pain. Another systematic review identified monotonous tasks, work relations, demands, stress and perceived ability to work as further factors related to back pain. A recent Canadian study on shoulder pain reported that – in addition to the physical characteristics of the work, previous shoulder pain and industry sector – being occasionally or never satisfied with support from colleagues was among the factors associated with an increased likelihood of claims for shoulder pain to the Workers’ Compensation Board. Harassment and hostility at the workplace are other aspects worth mentioning in this context; for example, neck pain was found to be significantly associated with intimidation at work in both genders and also with unwanted sexual attention in women. Gender and nationality may be important for back pain, also; a study from Saudi Arabia identified them as significant factors.

Pain interfering with work
Even though precise estimates may be difficult, there is general agreement that the amount of lost productive time due to painful conditions is enormous. Roughly one-fifth of adults suffer from a chronic painful condition,
and about one-fifth of those with such a condition are unable to work, with this latter figure varying from 13% to 76% between different painful conditions and studies\(^7\). Not surprisingly, the extent of interference with work increases with pain severity\(^7\). Furthermore, musculoskeletal pain may not only impair work ability at the time but has also been shown to be a predictor of disability in the distant future\(^8\).

It was calculated that for the United States in a one-year period, 22.4 million cases of back pain lasting 1 week or more were responsible for 149 million lost workdays\(^9\). A cross-sectional study found that 52.7% of the workforce reported headache, back pain, arthritis or other musculoskeletal pain over a 2-week period with 12.7% losing productive time due to a common pain condition. Headache was the most common pain condition causing lost productive time (afflicting 5.4%) in that study, followed by back pain (afflicting 3.2%). The average productive time lost, among those who did lose productive time due to a chronic pain condition, was 4.6 h per week\(^10\).

Characteristics of the painful condition as well as work-related factors may be predictors of lost productive time. For example, workers with back pain exacerbations were more likely to report back pain-related lost productive time than those without exacerbations\(^11\). Among nursing personnel who sought treatment for back pain, a sudden onset of pain, severe pain and working less than 5 years at the hospital were among the predictors of time off\(^12\). Among injured workers with chronic pain, those with high levels of pain and disability were more likely to catastrophise, with subsequent poor recovery outcomes\(^13\).

Pain treatment and work-related outcomes

Return to work upon successful pain management is a critical outcome, for patients, doctors and society. It is also an outcome by which it is possible to measure treatment success, in clinical practice and in clinical trials. In clinical practice, giving the right treatment to the right patient is key, as a study from Norway illustrated. The study categorised patients with musculoskeletal pain who had been off work for 8 weeks or more into three groups differing in the prognosis for return to work: good, medium or poor prognosis. Patients were then randomly assigned to three types of treatment differing in intensity: ordinary treatment, light multidisciplinary and extensive multidisciplinary treatment. Overall, the prognosis was related to actual return to work after 14 months and, when data for all patients were analysed, both light and extensive multidisciplinary treatments increased the possibility of returning to work compared with ordinary treatment. However, there were important differences between patients. For individuals with a good prognosis, all three treatments worked equally well; here the return to work rate was not higher with extensive multidisciplinary treatment than with ordinary treatment. Patients with a medium prognosis benefited equally from the light and the extensive multidisciplinary treatments, and both of these were superior to ordinary treatment. Among patients with a poor prognosis, those randomised to extensive multidisciplinary treatment did best; ordinary treatment and light multidisciplinary treatment gave poor results\(^14\).

Work-related outcomes are also of key importance in judging the effectiveness of treatments for painful conditions in clinical trials, and in developing the methodology for making such judgments. Clinical trials in the pain field typically have been comparing different pain treatments (active treatment vs. placebo or comparing active treatments to one another) based on an evaluation of treatment group average values of pain intensity or pain relief scores. What is becoming increasingly clear, as more trial data are analysed and meta-analysed in individual patient analyses, is that the frequency distributions for pain scores within treatment groups are often not normal (Gaussian, bell shaped) distributions but are instead bimodal, reflecting the fact that patients typically either respond well or respond poorly to pain treatments with few patients experiencing the treatment group average pain relief\(^15\). Reasons for this are probably complex and at present incompletely understood but they fundamentally must have to do with between-patient heterogeneity, for example, in how analgesics are metabolised. Another consideration is that the same diagnostic label may conceivably encompass more than one pathophysiological disease entity, and that these may respond differently to different treatments. Because the distributions of pain scores often are non-normal, comparisons based on mean data are often not informative about individual patient experience, even though trial data may be presented in such a way in publications.

A way around this dilemma, and towards a meaningful evaluation of pain treatments, is to use responder analysis and compare treatments by comparing the proportions of patients who achieve responder status. The question is how to define a responder. A consensus statement describes, for trials in chronic painful conditions, that experiencing at least 30% decrease in numerical rating pain scores over baseline represents ‘moderately important’ improvement and that at least 50% decrease in pain scores represents ‘substantial’ improvement\(^16\). Other evidence suggests that being below 30 mm on a 100-mm visual analogue pain scale (VAS) is a useful target for a pain state as it corresponds to having at most mild pain\(^17\). However, these new
responder’ endpoints need to be validated. One way of validating them is to show that patients achieving at least 50% pain relief and/or a pain state below 30 mm on the VAS also achieve the most benefit in a number of other outcomes. Of course a range of functional outcomes needs to be investigated for such a validation, but work-related outcomes are especially important among them because ability to work has immediate implications on both an individual and a societal level. Indeed, time off work and interference with work change more favourably over the course of trials in patients achieving the response criteria of at least 50% pain relief and/or a pain state below 30 mm on the VAS compared with patients not achieving these response criteria. This has been shown in a meta-analysis of four trials of pregabalin for fibromyalgia lasting 8–14 weeks. In patients achieving both response criteria, the time off work decreased from 2.0 to 0.6 days of work missed per week over the trial duration; in patients not achieving either response criterion, the change was much smaller, from 2.3 to 1.9 days18.

It still needs to be investigated to what extent the above findings can be generalised to other musculoskeletal conditions. Potentially, there are a lot of data on which to investigate the relationship between pain and work in the context of clinical trials, because work-related outcomes are enquired about in a number of standard questionnaires that are often used in studies of pain treatments. However, a systematic review has recently shown that such work-related outcomes are only infrequently reported in publications resulting from pain trials19. A challenge for the future is to obtain and analyse such data.

Treatment and prevention of painful musculoskeletal conditions at the workplace

The work environment can also provide opportunities for the treatment and prevention of painful musculoskeletal conditions, although often there is no strong evidence to support such interventions. Three recent examples of evidence summarised in systematic reviews will illustrate this. The use of workplace ergonomics design, especially with regard to computer use at work, for the prevention work-related musculoskeletal disorders of the upper limb and neck has been the subject of such a recent systematic review20. The review identified two small trials comparing the use of an arm support together with an alternative computer mouse versus using a conventional mouse without an arm support, and the corresponding meta-analysis found a decreased incidence of neck or shoulder disorders that just reached statistical significance (relative risk 0.52, 95% confidence interval [CI] 0.27 to 0.99, based on 186 participants). No statistically significant difference was identified with regard to right upper limb disorders, but discomfort scores for neck/shoulder and right upper limb were both significantly reduced in the above comparison.

Manual handling advice is commonly given at the workplace, yet there is no evidence to support that it is effective. Another recent systematic review combined data from four trials and 297 participants comparing manual material handling advice versus no intervention in a meta-analysis using any back pain as an outcome; this demonstrated no effect (odds ratio 1.17 [95% CI 0.68 to 2.02])21.

Finally, back schools are interventions commonly performed in an occupational context, but again there is no evidence to support their effectiveness. A systematic review identified three studies comparing back schools with waiting list controls, no treatment or usual care. There were no significant differences in comparisons for pain or disability, and the review concluded that because of the quality of the evidence found and the paucity of data, one could not arrive at a firm conclusion on the clinical effectiveness of back schools22.

Conclusion

Appreciating the relationships between pain and work can be helpful in clinical practice and in research. We have a good understanding of how exposures at work may lead to painful musculoskeletal conditions and know that the impact of pain, often caused by musculoskeletal disorders, on lost time at work and productivity is considerable. Furthermore, work-related outcomes in pain trials are potentially important, both directly, for assessing the impact of interventions for pain on work ability, and indirectly, for validating the modern responder outcomes that are important to assess treatment efficacy overall. Finally, the workplace also provides an environment in which to conduct interventions for preventing and treating painful musculoskeletal disorders, but a firm evidence base is lacking.

References

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