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Management of occupation-related musculoskeletal disorders

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Occupation-related musculoskeletal disorders are a common clinical problem. Management presents challenges in understanding the factors that give rise to work loss and disability. To improve outcomes, practitioners need to screen for risk factors, understand the demands of work and workplaces and be prepared to actively assist the process of work return. There are limitations with regard to many therapeutic modalities commonly used, though there are many useful adjuncts for the physician in achieving improved outcomes.

Musculoskeletal disorders are a major cause of work absence and impaired work performance throughout industrialised nations. The intention of this article is primarily to discuss what is commonly referred to as soft-tissue injury, sprains and strains and non-specific low back pain (LBP). It relies much on the general literature that pertains to musculoskeletal disorders and, in particular, to LBP. Estimates from the European Union indicate that, over a 12-month period, approximately 4.9% of workers will report at least one occupation-related musculoskeletal disorder (ORMSD), with 1.3% of workers losing in excess of 1 month's work as a result [1]. Figures from the United States show a lower rate of work loss associated with ORMSD, with each year nearly 0.3% of workers presenting with work loss in excess of 1 month [2]. Whilst there are significant differences in disability assessment, rehabilitation and compensation eligibility between various countries, important differences in outcomes exist for ORMSD [3]. Differences in management may be one important factor influencing this.

ORMSDs occur in a complex context in which the injury or disease is attributed to the demands and circumstances of employment. This places obligations, incentives and actions on multiple parties, generating patterns of activity, interaction, disease and illness that are fundamentally different from

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that which most health providers will easily recognise. Applying familiar techniques of biomedical management to this model can, at times, be a disheartening experience.

Many ORMSDs represent common and non-specific, health conditions that arise during the course of work [4]. Attributing specific pathoanatomical diagnoses to these conditions at times may align them as diseases that require medical intervention, rather than as transient and benign phenomena that can be accommodated and assisted by participation in work. Abenhaim and colleagues [5] demonstrated the negative effects of inappropriate diagnoses in a large cohort of injured workers in Quebec, Canada. Early attribution of a specific, pathoanatomical back pain diagnosis was strongly associated with poor outcome at 24 months.

Skills in dissecting a narrative and conducting a physical examination are a prerequisite for assessment of ORMSD. The accompanying important aspect is the extent to which psychological, social and vocational factors must also be explored. Whilst in many injured workers, such factors may have only passing relevance in planning a recovery and return to work, such factors are disproportionately represented in ORMSDs that result in protracted disability and work absence.

What determines outcomes? Can risk be assessed?

Pathological factors often account poorly for important questions in ORMSD, such as presentation, variations in prevalence, prognosis, disability duration, return to work, therapy selection and management [6]. Among those factors that can be readily appreciated are initial pain and disability scores, and general health status. Factors described as psychosocial, an interacting collection of individual, group and social factors, are predictive of the longitudinal course of many illnesses, including ORMSD [7]. Observations of the influence of such factors in medicine are not new. As Sir William Osler observed, “It is much more important to know what sort of patient has a disease than what sort of disease a patient has [8].”

Assessing risk factors for disease is a familiar process in clinical medicine. Risk factor screening for serious medical conditions is readily achieved for musculoskeletal conditions – by the application of the so called ‘red flags’ [9], though specificity [10] is lacking. ‘Yellow flags’ are posited as important psychosocial, non-biomedical risk factors that may require specific intervention. In acute LBP, subgroups of patients can be readily identified depending on whether disability is related to pain beliefs, emotional distress or workplace concerns [11]. Psychosocial risk factors may influence the journey from injury to chronic disability [12–14]. Factors can be seen as phasic in action, acting before injury or early in injury (acute and sub-acute) or in persisting work disability [15].

The work environment has a number of important factors that contribute to physical and psychosocial risk factors [16–20]. Physical factors at the workplace, such as ergonomic load, manual handling and the physical work environment, have an influence on the incidence on ORMSD and also act as a barrier to return to work in the presence of activity limitation. Work organisation factors such as supervisory support, high demand and low control (derived from the work stress model) [21] and high perceived workload are similarly associated with increased risk for ORMSD and lower success of rehabilitation [22]. In a study of Boeing aircraft workers, job dissatisfaction and distress appeared the most significant [23]. However, such findings may not generalise from LBP to other conditions [24].

One tool developed for clinical use to identify early those at risk for long-term disability is the Orebro Musculoskeletal Questionnaire. At 6 months’ follow-up after initial administration, scores above a cut-off exhibited a sensitivity of 89%, a specificity of 65% for prolonged absenteeism, and a sensitivity of 74% and a specificity of 79% for functional ability.[25]

Mood disorders, particularly major depressive disorder, appear to be underdiagnosed in the early stages of work-related injury [26]. At the end of the anxiety spectrum, panic disorder or post-traumatic stress disorder (PTSD) can occur following exposure to high levels of real or perceived danger, especially when injury occurs [27]. PTSD and chronic pain are intimately associated, sharing certain common central mechanisms [28]. Chronic, untreated PTSD can run a protracted course with severe psychiatric and physical morbidity, and must be recognised as an important obstacle to recovery following some types of ORMSD [29].

Screening for mood disorders can be as straightforward as asking an individual two simple questions: “Over the past month, have you felt down, depressed, or hopeless?” and “Over the past month,

have you felt little interest or pleasure in doing things?" Respondents need more in-depth screening and clinical assessment [30]. Anxiety disorders are not as easily screened and the use of a validated instrument is useful. A number of validated questionnaires with high sensitivity and specificity are available. These are frequently combined with scales examining other aspects of affective disturbance, and can be completed by a patient in the waiting room [30].

A potential contributor to the complexity of managing ORMSD is the experience of anger and perceived injustice regarding the circumstances of injury, claim adjudication and rehabilitation [7,31]. Turk and colleagues [32] identified high levels of anger in a population of chronic pain patients, whilst Kerns and colleagues [33] were able to demonstrate strong associations between anger, affective disturbance and self-rated disability. The presence of depression and anger appears to have a negative effect on the relationship between injured workers and treatment providers [31]. Over 60% of chronic pain patients in one study harboured high levels of anger towards their doctors [32]. Bruns and colleagues identified chronic pain, litigation and affective dysregulation as the strongest predictors of homicidal ideation towards doctors [34].

Biopsychosocial risk factor screening is a useful tool for rehabilitation and injury management, and should be differentiated from conceptualisations of work disability derived from 'organic' versus psychiatric models or motivational/malingering constructs. In 1980, Waddell, an orthopaedic spinal surgeon, described a series of signs observed during examination of the lumbar spine and posited that these occurred independently of pathoanatomical processes [35]. Main described the growing misuse of these signs [36]. Fishbain and colleagues subsequently published a detailed review of studies describing the use of Waddell signs [37]. This analysis of 57 published studies confirmed that Waddell signs were associated with poorer treatment outcomes. They were not able to demonstrate that Waddell signs were associated with 'non-organic' factors, secondary gain, malingering or a proxy for a psychological disorder [38].

Management approaches to ORMSD

The role of medical imaging

The use of medical imaging in ORMSDs is widespread. The presumptions for this are in terms of establishing a clear pathoanatomical diagnosis to guide treatment and estimate prognosis. Unfortunately, this premise is limited by the non-specific nature of many findings demonstrated by advanced imaging techniques. Magnetic resonance imaging (MRI), demonstrates localised pathology in asymptomatic individuals at a similar rate to subjects with pain in the lumbar spine [39], cervical spine [40–43] and upper limb [44,45] – the three sites [9] most frequently involved in ORMSDs. For the lumbar spine, there is good evidence to suggest that outcomes are no better, and possibly worse, where greater levels of imaging are employed [39,46]. Despite that fact, paradoxically, patients are more satisfied. It is prudent to consider the use of medical imaging as an adjunct to clinical skills and to be used when the results of the imaging may significantly alter management.

Medical interventions

Medical interventions encompass an enormous range of treatments that may be applied to the setting of ORMSD. This clinical area sees a significant amount of operative surgical management. Harris investigated the outcomes for orthopaedic surgery and compensation status in a meta-analysis. Of the 211 articles that met the inclusion criteria, 35 reported equivocal or no differences in outcome, one a favourable difference and 175 a worse outcome, with a summary odds ratio of 3.75 [47].

Before considering individual groups of interventions, it is worth posing the question as to what medical intervention is actually trying to achieve? For ORMSDs, and for musculoskeletal disorders in adults of working age, it is reasonable to suggest that at least one of the goals of medical intervention should be to facilitate the return of an injured worker in a productive capacity to the workforce. Few medical interventions are evaluated on this basis. Thus, the precarious assumption is made that certain proxy markers will lead to potential success in the occupational injury setting. The two most commonly quoted outcome measures relating to interventions for musculoskeletal symptoms are

reduction in pain and improvement in physical function. Neither of these is perfect, as pain measures are subjective and reported pain experience can be affected by too many variables to make it reliable. Physical functioning as determined from history or questionnaire assessments, despite standardisation, show limited test–retest reliability and may be affected significantly by other medical co-morbidity [48,49]. There are a limited number of studies specific to ORMSDs, management and return to work.

Pharmacotherapy

The majority of analgesic prescribing in ORMSD involves paracetamol (acetaminophen), compound opioid analgesics and NSAIDs. Many preparations are available over the counter and are safe in prescribed doses [50], although the chronic use of NSAIDs is increasingly being recognised as a potential source of secondary morbidity [51]. Most of the data indicates little advantage over paracetamol. The evidence base for many NSAIDs is potentially compromised by the high proportion of industry-sponsored trials [52]. Compound opioid/paracetamol analgesics may offer a modest advantage over paracetamol, alone although evidence is sparse [53].

Potent opioids in chronic musculoskeletal pain

Worldwide, the most commonly used potent opioids are morphine, oxycodone, hydromorphone, fentanyl, buprenorphine and methadone. The use of these agents in chronic musculoskeletal pain has attracted considerable debate [54]. Unlike many other analgesic agents, there is a reasonable body of high-quality evidence examining the roles of potent opioids in work-related injury. What is clear from the majority of the literature is that there is little evidence of benefit. Studies in LBP and other musculoskeletal presentations appear to demonstrate that functional and vocational outcomes in those workers treated with opioid analgesics are worse than in those workers treated with non-opioids [55–57]. Adjustment for confounding by injury severity, a potential factor influencing prescribing, still shows compelling evidence of inferior outcomes [56]. This observation appears compatible with a wider body of evidence surrounding the use of opioids in chronic musculoskeletal pain [58].

There are likely to be multiple reasons behind the failure of opioids in musculoskeletal pain. Opioids have their greatest effect on pain transmitted via C-fibre pathways where there are high densities of pre- and postsynaptic opioid receptors. Unfortunately, much pain associated with musculoskeletal disease, particularly movement-associated pain, appears to be transmitted along A-delta fibre pathways that are much less amenable to opioid blockade [59,60]. These pathways carry well-localised “fast pain” that is difficult to inhibit, even at very high opioid concentrations. Opioid pharmacology is extraordinarily complex, with a vast range of actions within the nervous system ranging from thermoregulation and neuroendocrine regulation, through emotional interpretation and actions as apparently disconnected as control of gut motility and bladder function. Analgesia represents but one small facet of this range of actions, but cannot be achieved without effects on many other systems.

Opioids invariably induce tolerance to their analgesic effects. This is seen clinically as a declining analgesic effect with continuous use, and appears unavoidable. Tolerance can reach extraordinary levels so that effective analgesia becomes essentially impossible to achieve. It has recently been recognised that the same processes associated with opioid tolerance can actually lead to a reversal of opioid effect and a state of ‘hyperalgesia’, where the use of opioids actually worsens pain [61,62].

The prescribing of potent opioids involves potential adverse outcomes. Direct deaths due to inadvertent or deliberate overdose together with “indirect” deaths, primarily associated with drug diversion, are substantial and difficult to justify where expected benefits are modest [63,64]. Furthermore, the use of opioids is associated with cognitive impairment, particularly during commencement and dose escalation, and secondary psychiatric sequelae, most notably drug addiction [65].

Adjunctive agents

The use of antidepressant drugs as adjuncts to other forms of analgesic medication has been described for many years. There is evidence of benefit of tricyclic antidepressant drugs in a number of

musculoskeletal disorders as well as for chronic widespread pain. The mode of action is unclear and appears, at least in part, to be independent of antidepressant activity [66]. Of the more modern agents, those agents with activity on both serotonergic and noradrenergic reuptake, such as venlafaxine, duloxetine and milnacipran appear beneficial, although the evidence base is small [67–69].

Anticonvulsant agents, particularly phenytoin, carbamazepine, gabapentin and pregabalin have been demonstrated to provide symptomatic relief in patients with neuropathic pain. Their role in musculoskeletal pain is much less clear. Nevertheless, gabapentin and pregabalin have both seen increasing use in musculoskeletal disorders. There is evidence of benefit in chronic widespread pain (the fibromyalgia syndrome) with improvements in sleep, mood and reported pain [70,71], although the mechanism is unclear. In addition, some unusual trial designs have been employed and the value of this evidence is uncertain. There does not appear to be evidence of effect in LBP without radiculopathy [72].

Adverse effects, including cognitive impairment, are common with these agents [73,74]. Compliance and patient acceptability are limiting factors.

Interventional techniques

Regional corticosteroid injections

Local corticosteroid injection represents one of the most common interventions in musculoskeletal medicine, and is widely employed in ORMSD. Corticosteroid injection into synovial joint spaces has been performed for decades, although systematic evaluation is relatively recent.

Corticosteroid injections into the shoulder joint have some evidence of benefit over placebo in shoulder disorders [75], although whether this translates into benefit in the work-injured shoulder is less clear. More advanced techniques using radiological guidance to infiltrate presumed painful structures appear to offer little advantage over simple infiltration of the subacromial space.

Corticosteroid injections into more distal regions of the upper limb have less supporting evidence than injections into the shoulder. What evidence exists has tended to support their short-term use in conditions, such as de Quervain's tenosynovitis [76]. Injecting corticosteroids into the compact joint and tendon spaces of the distal forearm exposes these structures to very high concentrations of steroids, and serious adverse events have been reported [77,78].

Variable evidence exists for the use of steroid injections in the lower limb. Low-volume corticosteroid injection into the knee joint appears to be safe and effective for the short-term treatment of pain related to osteoarthritis [79]. However, there is less evidence to suggest that such treatment is beneficial for the treatment of non-synovial soft-tissue injuries that may arise as a consequence of acute injury. In addition, caution must be exercised if surgical intervention is being considered as the prior use of intra-articular corticosteroids appears to be associated with a significantly increased risk of postoperative septic arthritis [80].

Corticosteroids are catabolic hormones that impair normal processes of healing. This may explain the observation that degradation and rupture of tendons, such as the Achilles tendon, appear more frequent after local corticosteroid treatment [81]. A more recent review has cast further doubt on the long-term safety and efficacy of corticosteroid injections for tendinopathy [82,83].

Spinal interventions

Interventions for the management of spinal pain and associated disability are numerous. They represent a separate microcosm of medical practise, and an extensive literature relating to interventional spinal therapies has developed. Much of the literature is based on populations outside the ORMSD environment. Spinal interventions can be grouped into those aiming to treat intervertebral discs and symptomatic facet joints and those targeting the epidural space.

Targeting intervertebral discs has logic inasmuch as abnormal neuropathological changes have been identified in degenerate and damaged lumbar discs that may render parts of the disc painful. However, manoeuvres aiming to ablate or denervate painful areas of disc have failed to demonstrate any therapeutic efficacy [84]. Therapeutic manoeuvres targeting facet joint pain have been employed for decades. Infiltration of the facet joints with corticosteroid preparations is possibly the most common

invasive procedure employed in regional back and neck pain. Radiofrequency denervation of facet joints has been described for over 30 years, and surgical denervation of the facet joints also has a long history. The rationale for these techniques is based on the observation of 'arthritic' change in spinal facet joints, implying structural radiologic abnormality as the source of nociception, and on studies that have identified the facet joint as a potential pain source. Corticosteroid infiltration into facet joints has no demonstrated therapeutic efficacy above placebo [85–87].

Radiofrequency denervation of facet joints is a technically demanding procedure that requires careful patient assessment, including trials of temporary neural blockade with local anaesthetic, if reasonable outcomes are to be achieved [85,86]. Examination of Australian insurance reimbursement data [88] indicates that the latter does not occur. Overall, it is estimated that a small and highly selected proportion of patients may benefit from this procedure [89], although there is dispute over the strength of supporting evidence, as well as valid and practical methods of identifying eligible subjects. Symptom recurrence is common over 12–24 months.

The evidence supporting cervical facet-joint denervation is less substantial than for the lumbar region, although the procedure appears to be widely employed. For the thoracic region and sacroiliac joints, no appropriately controlled clinical trials have been conducted to date.

Epidural corticosteroid injection has been performed for over 50 years. Analysis of randomised controlled trials has shown that the procedure can provide generally short to medium term improvements in lumbar radicular pain, although the effect size is modest [86,87]. As was noted in the case of steroid facet-joint injections, there is sufficient evidence to say that epidural corticosteroid injection has no better efficacy than placebo in the management of regional LBP syndromes. In the treatment of radicular pain, the symptom relief provided by epidural corticosteroid injection is accompanied by small improvements in functional status. Epidural corticosteroid injections have also been employed in the thoracic and cervical regions for regional spinal pain and radiculopathy, although evidence of efficacy is weak. Potential complications, particularly in the cervical region, are serious, and caution is warranted in the use of such procedures.

The use of 'neuromodulation' techniques has expanded significantly in recent years. The term generally applies to implanted neural stimulator systems that stimulate the central or peripheral nervous system. Spinal cord stimulation may have some benefit in peripheral neuropathic pain, although any effect is generally modest and whether the effects can be sustained is uncertain. The outcomes of this technique in work-injured populations appear to be disappointing [90].

There is no substantial evidence that spinal cord stimulation is beneficial in mechanical or degenerative spinal pain. There is no evidence supporting the use of peripheral nerve or 'peripheral field' stimulation in the management of regional spinal pain. The scientific hypotheses advanced to explain a supposed therapeutic effect are weak, and there is a clear absence of high-quality controlled research. The equipment and associated costs involve substantial capital outlay.

Multidisciplinary pain management

The poor outcomes associated with traditional biomedical approaches to chronically painful musculoskeletal conditions led to the search for alternative management approaches from the 1970s onwards. Recognition of a number of factors associated with chronic musculoskeletal pain, such as the role of co-existing mood disturbances and maladaptive cognitions and behaviours, suggested a role for psychological therapies, and, most notably, cognitive behavioural therapy (CBT). Development of this treatment model led to the concept of multidisciplinary pain management programmes (MDPMPs) for small groups of individuals with chronic musculoskeletal pain. Such programmes incorporate elements of health education, CBT and active physiotherapy (usually some form of graded exercise) to aim for an overall goal of functional restoration, improvements in mood and self-efficacy and reduction in health-care dependence (including medication).

Many studies reported impressive improvement on a variety of measures, although comparison was often made with waiting list controls. Similarly, significant variations in programme content and duration are evident, making meta-analysis difficult. The use of such programmes attracts vigorous debate, with some parties advocating them as the treatment of choice in ORMSD [91], and others labelling them as costly and ineffective whilst lamenting the fact that they continue to be supported [92].

Evidence supporting the use of MDPMPs is reasonably consistent across a number of musculoskeletal conditions, and there is evidence from meta-analysis to confirm the therapeutic effect [93]. The best evidence appears to come from studies examining the effect of MDPMPs in LBP, including occupational LBP [94]. Effects are much less certain in upper limb pain [95].

One potential advantage of MDPMPs is that psychological challenges associated with the working environment can be identified and specifically addressed during the programme. Where this is combined with specific contact with the workplace, there appears to be an enhanced effect of the treatment [94].

MDPMPs have struggled to find acceptance following occupational injury [91]. The reasons for this appear variable, although there appears to have been a general tendency for such programmes to be recommended when 'standard' medical treatment has failed, often at the end of a considerable process of extended therapy and investigations with a greater focus on biomedical diagnoses [96,97]. Other reasons include cost and programme availability. Presentation to MDPMPs tends to occur after multiple failed medical interventions and prolonged periods of work absence. This is a difficult area in which to generate positive clinical and vocational outcomes. Groups at low risk of persisting disability based on screening are unlikely to benefit from MDMPs [98], and the intervention should not be applied indiscriminately to low-risk groups [99].

Influencing outcomes

Physicians provide powerful advice that can influence injured worker's expectations and outcomes [100], with often long-term positive effect [101,102]. Important components include explanations about the diagnosis, dealing with patients' concerns including the presence of serious disease, explaining the causes of the pain, providing reassurance, exploring psychosocial issues and planning what can be done [103,104]. A consultation style that includes the assessment and management of psychosocial factors may positively influence outcomes [105]. Negative pain beliefs and attitudes of health-care providers influence the advice given about rest, activity and return to work [106].

Certification of cause and work ability can generate considerable conflict and ambiguity for medical professionals [107]. Physicians are often asked to recommend appropriate levels of activity and work. These recommendations have significant consequences for patients' general health, employment and financial well-being. Return to work does not comprise a significant amount of medical education. However, presumption of this skill is made by workers, employers and support systems. Recommendations may reflect personal attitudes of the physicians, as well as factors related to the patients' clinical symptoms [108,109]. Providing training to physicians in management skills for acute–sub-acute LBP has improved return to work times and reduced disability durations [110], and this may serve as an important way of improving outcomes for ORMSD.

A novel television information campaign in the Australian state of Victoria highlighted the essentially benign nature of LBP, and advocated an early return to activities. This influenced concurrently physician and worker beliefs about LBP [111], that were sustained at 3 years [112].

The rise of the repetitive strain injury (RSI) epidemic in Australia during the 1970s perturbed medical, workplace and social systems. Health responses saw the development of diagnostic and prognostic classifications, and, in many cases, poor prognostication was offered based on a logic of excessive workplace trauma and the need to rest. Specialised clinics developed offering arrays of assessment and treatment protocols. By the end of the 1980s, the incidence of RSI had markedly declined and had largely vanished a decade later, evidencing the powerful influences that social, judicial determinations and psychosocial factors have, including on the medical profession.

Return to work as an important objective of medical practice is expressed in many consensus statements. The process itself is patient centred and requires consideration of the biopsychosocial context, clinical factors and the job–person fit. Talmage [113] proposes the consideration of the following parameters: 'risk' as the likelihood of harm due to specific activities or work environment factors; 'capacity' as quantifiable measures of strength, endurance and flexibility; 'tolerance' as a psychophysical construct influenced by a range of personal, injury and job-specific factors. The evidence base does not allow for precise determinations around many common recommendations, such as lift limits from pathoanatomical risks. Secondary factors, such as lift frequency, distance from the body, grip and control of load and horizontal and vertical travel, all compound the interpretation.

Considering work tasks dynamically with the worker and employer may overcome these limitations, and lead to constructive work recommendations that can incorporate issues such as supervision, safety and practicality. Questions directed to routine activities, work postures, loads, equipment used, most demanding tasks, work routines, breaks, rotations, work environment, essential job demands and information about potential accommodations, aid in this process.

Resources at the workplace form a critical support for return to work. Return to work coordinators can assist by undertaking activities, such as planning modified or alternate work and developing communication and agreement among stakeholders. Important competencies include assessing practical and safe job accommodation, communication and conflict resolution [114]. Establishing common agreed-upon goals between the worker, health providers and the workplace can lead to improved outcomes [115,116]. Importantly offers of work accommodation by employers can nearly double the rate of early return to work [117].

The workplace as the locus for management of ORMSD has been a more recent development. Loisel demonstrated that workplace intervention based on participatory ergonomics, graded activity programme and cognitive behavioural principles had short-term- and durable advantages over conventional management with or without exercise. The workplace components were critical to the effect, with evidence of sustained cost-effectiveness [118].

Discussion

Much of this article has rested on considering a biomedical view that incorporates diagnosis and treatment, with consideration of broader psychosocial factors. For ORMSD management to be effective, consideration and knowledge of the demands of work and workplaces, and the requirements of relevant workers compensation and social security and entitlement systems is essential.

Much of the available information derives from the general musculoskeletal literature. This is not specific to OMSRD, and mainly relates to LBP. The relatively small and specific body of literature for ORMSD is fragmentary and, importantly, needs to be better developed in demonstrating outcomes from interventions. For the secondary prevention of recurring conditions and disability, there is very little data.

Many of the current LBP guidelines have similar key messages around the importance of activity maintenance, avoiding undue rest and screening for risk factors (medical and psychosocial), with exercise and more structured intervention for persistent cases [119]. Fig. 1 proposes a stepped approach to management of OMSRD. This notes the generally good prognosis for most early cases of ORMSD, the value of screening, education, work rehabilitation and the monitoring of progress. The identification of risk factors for persisting pain and disability serves an important role in directing appropriate intervention at an early stage, and avoiding the secondary risk associated with prolonged work absence. The Quebec Task Force identified that the 7% of workers with low back injuries, who had not returned to work by 6 months, incurred 75% of the health costs for LBP treatment [120].

To make the biopsychosocial model effective requires being able to work with others who are involved in the return to work process, such as allied health providers and return to work coordinators. It requires an ability to communicate effectively with employers about limitations and restrictions, but also a focus on work ability and being able to steer workers with occupational musculoskeletal disorders towards better outcomes.

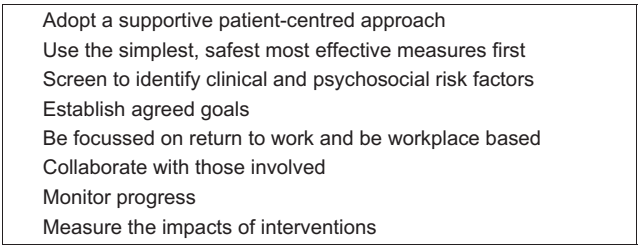

Fig. 1. Practice Point. Stepped Model for OMSD's.

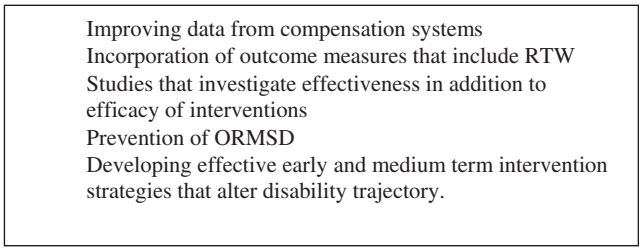

Fig. 2. Research Agenda ORMSD.

Whilst the prognosis is generally good for those early in the course of symptoms, there still remains a significant proportion for whom return to work does not eventuate, and for them the appropriate model is yet to be elucidated [121]. There is sufficient information to identify groups where the likelihood of return to work is lower. The current research has not demonstrated the universal effectiveness of any specific individual treatment modality, or range of combined treatment modalities, though some approaches appear to be more effective in different phases of disability. This is congruent with the important idea that the management of chronic musculoskeletal conditions differs significantly from acute presentations.

Interventions directed towards improving function, that is, averting disability and averting work loss, appear to have empiric support. A critical aspect appears to be the early involvement of the workplace, either through communication and coordination or through collaborative-type interventions, as demonstrated by Loisel [91,122]. The employer has a critical role in the maintenance of the relationship with the injured worker [117]. Evidence suggesting that the provision of alternative workplace duties is a key determinant in successful vocational rehabilitation is strong.

In the absence of strongly effective treatments in many circumstances, the monitoring of progress and outcomes with the use of tools and measures is recommended. This may permit objective assessment of the effectiveness of treatment on an individual level, and also assist in making decisions about continuing treatment where improvement does not occur.

There is still significant need for research for assisting return to work and developing occupational rehabilitation strategies, as well as in the primary diagnosis and treatment of musculoskeletal disorders [121]. The assessment of work ability, whether by tools, physical evaluation or clinical judgement, is another area of both consternation and uncertainty, and approaches that improve the predictability and sustainability of return to work need to be enhanced. Few compensation systems publish data on outcomes, return to work rates and their relationships to interventions, entitlement changes and rehabilitation initiatives. The observation that there are substantial cost, practise and outcome disparities between systems [123] needs further research [124,125]. Fig. 2 outlines priorities for the research agenda.

The prevention of work disability is not a secondary, but a primary outcome in the management of occupational musculoskeletal disorders, and is predicated upon a model of assessment, management and monitoring. Inasmuch as we have discussed the prevention of disability, emphasis needs to be placed on reducing the incidence of ORMSD. Progress may be made through effective ergonomics, safety systems, regulation, education and training. However, a key factor remains the quality of the workplace, aptly described by Hadler as the *Health Hazards in the Hateful Job* [126].

Conflict of interest

None.

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