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Work related upper limb disorders

BACKGROUND

Work related upper limb disorders (WRULDs) are among the most common workers' compensation claims. Their management is a challenge for medical practitioners for a range of reasons.

OBJECTIVE

This article describes the common WRULDs and summarises current management strategies.

DISCUSSION

The identification and management of WRULDs is complicated by diagnostic, aetiological and therapeutic uncertainties. The workers' compensation system further complicates the issue. Despite this, there are useful strategies that medical practitioners can employ to assist patients with upper limb pain in the work environment to alleviate distress, minimise disability and maximise function.

Upper limb pain is very common. Approximately 20% of the general community will complain of pain in the upper limb (most commonly at the shoulder) in any 1 month period.¹ Likewise, work related upper limb disorders (WRULDs) are common and expensive. For example, in 2003–2004 in South Australia, there were approximately 14 000 claims for compensation relating to injuries of the upper limb (36% of all musculoskeletal injury) with upper limb injuries accounting for approximately 30% of all workers' compensation claims in that year, and 29% (\$48 million) of the cost of musculoskeletal injury claims to the WorkCover Corporation.² This article focuses primarily on 'soft tissue' conditions and the contemporary literature in an attempt to assist medical practitioners with this common problem.

Symptoms in the upper limb may arise from discrete pathological conditions such as rotator cuff tendonitis or median nerve compression at the carpal tunnel. Alternatively, presentations may be nonspecific or mixed, reflecting pain associated physiological factors, which limit the ability to make a clear pathoanatomical diagnosis. Diagnoses for most conditions can be established but there is a lack of consensus as to what

constitutes a precise and rigorous case definition of a number of upper limb complaints. The clinical assessment process is complicated by the indirect links between aetiology, pathology, diagnostic label, and the subsequent impairment and disability. There is limited evidence as to the efficacy of a number of the treatments commonly used, and a lack of clear evidence based advice as to how to prevent these conditions in the workplace. This creates significant uncertainty for the practising clinician managing work related upper limb injury. The area is further complicated by a medicolegal environment which can be acrimonious and occasionally adversarial, and a workers' compensation system where access to financial support is determined in part by a legal (as well as medical) process. The recent history in Australia of 'repetition strain injury' (which was prominent in the 1980s and 1990s) involved many nonmedical factors and its legacy contributed to negative connotations about upper limb pain in the workplace.

Classification of common WRULDs

Classification systems of soft tissue disorders of the upper limb have been the subject of considerable criticism.³ More recently there have been attempts

to develop guidelines which appear to be more valid and reliable than earlier classifications.⁴⁻⁸ In the absence of an objective 'gold standard' against which clinical criteria can be compared, a structured assessment schedule based on the criteria developed by Harrington et al^{9,10} has been tested for reliability between observers in a rheumatology and community setting, and has been found to perform satisfactorily. Diagnostic criteria may differ from classification criteria, as the needs of the clinician differ from that of the epidemiologist, generally increasing sensitivity at the cost of specificity.^{11,12}

Association of upper limb conditions with work

The association between upper limb disorders and work has been widely studied and is the subject of a number of systematic reviews. The evidence remains limited because of poor quality data. What appears clear from the literature is that ergonomic, psychological and occupational psychosocial variables may all play roles in the development and maintenance of work related upper limb pain. *Table 1* summarises the known risk factors for the development of work related upper limb pain. It is important to note that these associations are not necessarily causal as much of the data are cross sectional in origin.

Assessment and management of WRULDs

From the preceding discussion it should be clear that focussing solely on the affected body part using a biomedical model of disease is unlikely to be sufficient to manage some cases.

The quality of evidence for the efficacy of a number of standard interventions for work related upper limb pain is poor. *Table 2* summarises the standard physical treatment available for upper limb pain and the quality of the available evidence for their efficacy. The majority of the evidence is not from work related injury, but from studies of community and clinic based populations.

In situations where the problem is slow to improve, it is appropriate to consider a biopsychosocial approach to managing the injury. *Table 3* summarises a 'stepped' return to work approach for WRULDs encompassing a biopsychosocial approach. A 'stepped' approach to assessment includes a history and examination identifying key elements such as the nature of the work and the workplace. A stepped approach is of particular value as many problems will often resolve without intervention. This approach avoids unnecessary investigation, medicalisation or treatment. Purposeful and interactive communication becomes the key to understanding

Table 1. Selected risk factors associated with work related upper limb pain

Site of pain	Ergonomic factors, odds ratio (CI)	Psychological factors, odds ratio (CI)	Occupational psychological factors, odds ratio (CI)
Shoulder ^{13,14}	Lifting 1.7 (0.9-3.0) Lifting at or above shoulder height 1.6 (1.0-2.5) Pushing or pulling 1.9 (1.1-3.3) Repetitive work 1.6 Awkward postures Duration of employment	Psychological morbidity 4.3 (1.2-3.0)	Exposure to monotonous work 1.7 (0.9-1.9) High job demands Poor workplace support 2.3 (1.1-4.6) Job control 1.6 Social support 1.6 Job satisfaction 1.3
Elbow ^{15,16}	Combination of force, repetition and/or vibration	Low levels of psychological wellbeing 7.9 (2.4-24.5)	High job demands 2.1 Low social support 2.2
Carpal tunnel syndrome ^{17,18}	Repetitive and forceful work 1.4 Repetitious activity involving prolonged flexion or twisting Exposure to vibration or percussion	Major depression	Poor job control 'Just in time' production systems
Forearm ¹⁹	Repetitive tasks 2.9 (1.2-7.3)	Psychological distress 1.8 (0.8-4.1)	Poor perceived support from colleagues/supervisors 2.6 (1.1-5.8)

beliefs, pain related behaviours and the interaction between the person and their work environment.³³

Identifying and problem solving barriers in the return to work process becomes an important part of the process of managing these conditions. The duration of disability and lack of anticipated progress become key

factors in the stepping up of assessment, management and intervention. At this point, important components of the assessment include workplace and environmental factors, the availability of suitable duties and work modification, personal factors including attitudes and beliefs about pain, recovery, work and activity, workplace

Table 2. Summary of treatment strategies for upper limb pain

	Medical/surgical intervention	Physical therapies	Other
Shoulder²⁰⁻²⁴	<p>Oral analgesics/NSAIDs</p> <p>Injected corticosteroids – subacromial steroid injection small benefit for rotator cuff disease. Intra-articular injection small benefit for adhesive capsulitis</p> <p>Surgical intervention – little evidence to support or refute efficacy of rotator cuff repair</p>	<p>Physiotherapy – effective for short term recovery in rotator cuff disease and function. Some benefit in adhesive capsulitis, calcific tendonitis</p>	<p>Workplace modification</p> <p>Acupuncture – little evidence to support or refute use</p> <p>Multidisciplinary biopsychosocial rehabilitation – little scientific evidence for effectiveness</p>
Elbow^{25,26}	<p>Corticosteroid injections – 90% initial response, relapse common</p>	<p>Splinting/orthotic devices – insufficient evidence as to efficacy</p> <p>Physical therapies – deep transverse friction massage – no benefit</p>	<p>Workplace modification</p> <p>Extracorporeal shock wave therapy – no significant benefit over placebo</p>
Carpal tunnel syndrome²⁷⁻²⁹	<p>Identify and manage underlying medical conditions</p> <p>NSAIDs/diuretics/pyridoxine – little evidence of efficacy</p> <p>Prednisolone 20 mg – evidence of short term symptom reduction</p> <p>Injection therapy – temporary benefit</p> <p>Surgical decompression – treatment of choice for proven CTS not responding to conservative therapy</p>	<p>Splinting – 80% of patients report some improvement</p> <p>More effective in neutral position</p>	<p>Avoid aggravating activities</p> <p>Yoga, carpal bone mobilisation – weak evidence of efficacy</p> <p>Magnet therapy, laser, exercise, chiropractic therapy – no benefit over control</p> <p>'Ergonomic' keyboard vs. standard keyboard – some evidence</p>
Wrist³⁰	<p>Simple analgesia/NSAIDs</p> <p>RICE</p> <p>Injection therapy – some evidence of efficacy</p> <p>Surgical decompression (De Quervains)</p>	<p>Local physiotherapy</p> <p>Splinting</p>	
Nonspecific arm pain^{31,32}	<p>Simple analgesia/NSAIDs</p> <p>Centrally acting drugs</p>	<p>Physiotherapy</p> <p>Limited evidence of exercise vs. massage, adding breaks during computer work, massage as add on treatment on manual therapy, manual therapy as add on treatment to exercise</p>	<p>Workplace modification – evidence that stress related interventions may be of benefit</p>

Table 3. 'Stepped approach' to work injury management**Most musculoskeletal conditions can be anticipated to resolve within a short time frame****The initial core assessment should include:**

- History
- Examination
- Provisional diagnosis
- An understanding of the work demands

Management actions include:

- Communication
- Certification including activity and return to work advice
- Explanation and reassurance
- Treatment plan

Implement a stepped care approach with review of progress against expectations

- Apply simple low intensity measures with progressive stepping up
- Absence from work for more than 3–6 weeks requires specific assessment of psychosocial and occupational risk factors concurrent with the clinical picture and management plan

Further assessment should include:

- Understanding the worker's perceptions about diagnosis, causation and treatment
- Assumptions about work
- Return to work issues and factors
- Workplace environmental, psychosocial and personal factors

Be prepared to modify the management plan and assessment approach depending on progress

- Prefer active treatments to passive modalities
- Collaboration with others involved and communication at the work place can positively influence early outcomes and identify relevant issues
- Low intensity interventions are less likely to be successful where there are significant barriers or prolonged disability
- Actively managing a return to work process with a practical problem solving framework can enhance early return to work and facilitate progressive improvement
- Managing risk factors associated with poor outcomes can assist with return to work

support and compensation issues. Individuals who may be at risk of developing long term disability can be identified with a semi-structured questionnaire such as the Örebro Musculoskeletal Pain Questionnaire,³⁴ which is available for download free of charge from the WorkCover Corporation of NSW website (www.workcover.nsw.gov.au).

The identification and appropriate management of psychological issues such as anxiety and depression can be central to treating WRULDs. Likewise, there is evidence that workplace assessments that identify and correct occupational ergonomic and psychosocial factors can reduce work disability duration and associated costs.³⁵ There is also evidence that work disability duration is reduced by work accommodation offers and contact between the health care provider and the workplace.³⁶ Workplace based interventions coupled with active management appear to be most successful where the disability duration is extended.³⁷ Pain units and other multidisciplinary services may play an

effective role in complex cases, although the evidence for their efficacy is limited.²⁰

Conclusion

The prevalence and costs involved in work related upper limb pain make the prevention of painful upper limb disorders one of the current major challenges in occupational health practice.³⁸ It may at least be in part achieved by: active symptom surveillance; early assessment and treatment; education and involvement of workers and line managers; a collaborative and nonadversarial approach; and the ergonomic assessment of jobs with engineering solutions to unsafe repetition, force and prolonged abnormal postures.³⁹

Dealing with a patient who has work related upper limb pain can be extremely challenging for the GP. A careful approach with an emphasis on communication, and the identification and management of physical, psychological, psychosocial and workplace problems

is likely to be most useful in alleviating distress and minimising disability. Opportunities for diagnosis based treatment should be acted upon and supplemented with a wider view of the possible determinants of pain and disability and the array of potentially modifiable factors.

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References

1. Urwin M, Symmons D, Allison T, et al. Estimating the burden of musculoskeletal disorders in the community: the comparative prevalence of symptoms at different anatomical sites, and the relation to social deprivation. *Ann Rheum Dis* 1998;57:649–55.
2. WorkCover Corporation Annual Report 2003–4. WorkCover South Australia 2005. Available at www.workcover.com [Accessed September 2006].
3. Buchbinder R, Goel V, Bombardier C, Hogg-Johnson S. Classification systems of soft tissue disorders of the neck and upper limb: do they satisfy methodological guidelines? *J Clin Epidemiol* 1996;49:141–9.
4. Walker-Bone K, Cooper C. Hard work never hurt anyone: or did it? A review of occupational associations with soft tissue musculoskeletal disorders of neck and upper limb. *Ann Rheum Dis* 2005;64:1391–6.
5. Harrington JM, Carter JT, Birrel L, Gompertz D. Surveillance case definitions for work related upper limb pain syndrome. *Occup Environ Med* 1998;55:264–71.
6. Sluiter J, Rest KM, Frings-Dresen MHW. Criteria document for evaluating the work-relatedness of upper extremity musculoskeletal disorders. *Scand J Work Environ Health* 2001;27(Suppl 1):1–102.
7. Helliwell PS, Bennett RM, Littlejohn G, Muiden KD, Wigley RD. Towards epidemiological criteria for soft tissue disorders of the arm. *Occup Med* 2003;53:313–9.
8. Huisstede BMA, Miedema HS, Verhagen AP, Koes BW, Verhaar JAN. Multidisciplinary consensus on terminology and classification of complaints of arm, neck and/or shoulder. *Occup Environ Med* Oct 2006; doi:10.1136/oem.2005.023861.
9. Palmer K, Walker-Bone K, Inaker C, et al. The Southampton examination schedule for the diagnosis of musculoskeletal disorders of the upper limb. *Ann Rheum Dis* 2000;59:5–11.
10. Walker-Bone K, Byng P, Linaker C, et al. Reliability of the Southampton examination schedule for the diagnosis of upper limb disorders in the general population. *Ann Rheum Dis* 2002;61:1103–6.
11. Helliwell PS. Diagnostic criteria for work related upper limb disorders. *Br J Rheumatol* 1996;35:1195–6.
12. NHMRC. Evidence based management of acute musculoskeletal pain. Australian Academic Press, 2004.
13. Van der Windt D, Thomas E, Pope DP, et al. Occupational risk factors for shoulder pain: a systematic review *Occup Environ Med* 2000;57:433–42.
14. Andersen JH, Kaergaard A, Mikkelsen S, et al. Risk factors in the onset of neck/shoulder pain in a prospective study of workers in industrial and service companies. *Occup Environ Med* 2003;60:649–54.
15. Viikari-Juntura E, Kurppa K, Kuosma E, Huuskonen M, Kivi P. Prevalence of epicondylitis and tenosynovitis among meatcutters. *Scand J Work Environ Health* 1991;17:32–7.
16. Van den Heuvel SG, van der Beek AJ, Blatter BM, Hoogendoorn WE, Bongers PM. Psychosocial work characteristics in relation to neck and upper limb symptoms. *Pain* 2005;114:47–53.
17. Bernard BP, editor. Musculoskeletal disorders and workplace factors: a critical review of the epidemiological evidence for work related musculoskeletal disorders of the neck, upper extremity and low back. Cincinnati: National Institute for Occupational Safety and Health. July 1997 DHHS (NIOSH) Publication no. 97–141. Washington DC: US Dept of Health and Human Services.
18. White PD, Henderson M, Pearson RM, Coldrick AR, White AG, Kidd BL. Illness behaviour and psychosocial factors in diffuse upper limb pain disorder: a case control study. *J Rheumatol* 2003;30:139–45.
19. Macfarlane GJ, Hunt IM, Stilman AJ. Role of Mechanical and psychological factors in the onset of forearm pain: prospective population based study. *BMJ* 2000;321:1–5.
20. S Green, R Buchbinder, S Hetrick. Acupuncture for shoulder pain. *Cochrane Data Syst Rev* 2005; Issue 2. CD005319.
21. Karjalainen K, Malmivaara A, van Tulder M, et al. Multidisciplinary biopsychosocial rehabilitation for neck and shoulder pain among working age adults. *Cochrane Database of Systematic Reviews* 2003; Issue 2. CD002194.
22. Green S, Buchbinder R, Hetrick S. Physiotherapy interventions for shoulder pain. *Cochrane Data Syst Rev* 2003; Issue 2. CD004258.
23. Buchbinder R, Green S, Youd JM. Corticosteroid injection for shoulder pain. *Cochrane Data Syst Rev* 2003; Issue 1. CD004016.
24. Ejinisman B, Andreoli CV, Soares BGO, et al. Intervention for tears of the rotator cuff in adults. *Cochrane Data of Syst Rev* 2004; Issue 1. CD002758.
25. Striys PAA, Smidt N, Arola H, Dijk van CN, Buchbinder R, Assendelft WJJ. Orthotic devices for the treatment of tennis elbow. *Cochrane Data Syst Rev* 2002; Issue 1. CD001821.
26. Buchbinder R, Green S, Youd JM Assendelft WJJ, Barnsley L, Smidt N. Shock wave therapy for lateral elbow pain. *Cochrane Data of Syst Reviews* 2005; Issue 4. CD003524.
27. O'Connor D, Marshall S, Massey-Westropp N. Non-surgical treatment (other than steroid injection) for carpal tunnel syndrome. *Cochrane Database Syst Rev* 2003; CD003219.
28. Marshall S, Tardif G, Ashworth N. Local corticosteroid injection for carpal tunnel syndrome. *Cochrane Database Syst Rev* 2003; CD0015B4.
29. Shin AY, Perlman M, Shin PA, Garay AA. Disability outcomes in a worker's compensation population: surgical versus non-surgical treatment of carpal tunnel syndrome. *Am J Orthop* 2000;29:179–84.
30. Sawaizumi T, Nanno M, Ito H. De Quervain's disease: efficacy of intra-sheath triamcinolone injection. *Int Orthop* 2006; Jun 8 (epub ahead of print).
31. Verhagen AP, Karels C, Bierma-Zeinstra SMA, et al. Ergonomic and Physiotherapeutic interventions for treating work related complaints of the arm, neck or shoulder in adults. *Cochrane Data of Syst Rev* 2006; Issue 3. CD003471.
32. Pransky G, Robertson MM, Moon SD. Stress and work related upper extremity disorders: implications for prevention and management. *Am J Ind Med* 2002;41:443–55.
33. Charlton JE, editor. IASP Core curriculum for professional education in pain. Ch 23 Work rehabilitation. IASP Press 2005;113–6.
34. Linton SJ, Boersmak K. Early identification of patients at risk of developing a persistent back problem: the predictive validity of the Orebro Musculoskeletal Pain Questionnaire (OMPQ). *Clin J Pain* 2003;19:80–6.
35. Franche R, Cullen K, Clarke J, et al. Workplace based return to work interventions: a systematic review of the quantitative literature. *J Occ Rehab* 2005;15:607–31.
36. Kraus N, Dasinger L, Neuhauser F. Modified work and return to work: a review of the literature. *J Occup Rehabil* 1998;8:113–39.
37. Loisel P, Abenham L, Durand P, et al. A randomised control trial on back pain management. *Spine* 1997;22:2911–8.
38. Coggon D, Palmer KT, Walker-Bone K. Occupational and upper limb disorders. *Rheumatology* 2000;39:1057–9.
39. Helliwell PS. The elbow, forearm, wrist and hand. *Baillieres Clin Rheumatol* 1999;13:311–28.