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Conservative treatment of work-related upper limb disorders—a review

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Aim The literature review was carried out to identify and summarize the evidence-base for conservative clinical management of upper limb disorders (ULDs) including specific disorders and non-specific ULDs.

Method Keywords were identified through a scoping study and guidance from the project sponsor. A number of databases were searched including Web of Knowledge, Pub Med, Medline, Ergonomics Online, the Cochrane Library and BMJ Clinical Evidence for the years 1993–2004. Abstracts were obtained for papers identified in the search and full papers were obtained for literature, which included diagnostic methods, conservative treatments, new data or results or systematic reviews.

Results The review identified that there is evidence for the efficacy of conservative treatments for the management of carpal tunnel syndrome, epicondylitis, rotator cuff tendonitis and bicipital tendonitis and tension neck syndrome. There was no evidence found to support or refute conservative treatment of tenosynovitis, tendonitis, de Quervain's disease or diffuse non-specific ULDs.

Conclusion The evidence reviewed was not always of good quality and data gaps including methodological design issues need to be addressed by future research.

Key words Evidence-base; musculoskeletal; treatment.

Introduction

The following review was carried out to identify and summarize the evidence-base for conservative clinical management of upper limb disorders (ULDs). This was the initial stage of a study to examine conservative clinical management of ULDs and how health professionals can be more effective. The literature review was carried out to identify what current evidence there is in musculoskeletal medicine nationally and internationally for the conservative management of musculoskeletal disorders and ULDs in order to find best practice in the treatment of ULDs.

Method

Relevant literature was obtained via the following research strategy, which was based on the methodology developed by the Centre for Reviews and Dissemination at the University of York [1]. Keywords were identified after a scoping study and guidance from the sponsor. The keywords were then cross-searched with general terms including musculoskeletal disorders, ULDs and specific disorders including tendonitis, tenosynovitis, rotator cuff tendonitis, bicipital tendonitis, carpal tunnel syndrome (CTS), de Quervain's disease, shoulder capsulitis, medial and lateral epicondylitis, diffuse, non-specific ULDs, tension neck and impingement syndrome. Hand–arm vibration syndrome (HAVS) was deemed beyond the scope of the study and was not included in the search.

To identify published research, the following databases were searched using the time frame of 1993–2004. The databases included Web of Knowledge (including the Science Citation Index and the Social Science Citation Index), Pub Med and Medline, Ergonomics Online, The Cochrane Library and BMJ Clinical Evidence. The time period was specified as it was thought that research in the last 10 years would be more relevant to the review.

The first sweep of the databases identified 408 references and the researchers reviewed the abstracts. Full papers were obtained for papers based on the criteria that they included conservative treatments for the specific disorders described, new data or results and systematic reviews. One of the initial drawbacks immediately identified

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was that many of the papers due to their time of publication did not use the criteria developed by Harrington *et al.* [2] or Sluiter *et al.* [3]. A decision was made to include all papers and where described in the study, report the criteria used in the diagnosis of participants. Where criteria for conservative treatments, new data or results were not reached, the paper was excluded from the review. In total, 352 papers were excluded from the review as they did not include conservative treatments or new data.

The information from each paper was evaluated and summarized. The information extracted from each paper included sample size, interventions undertaken, outcome measures and outcomes. The papers were assessed on the basis of no evidence, limited evidence for efficacy of treatment and good evidence for efficacy of treatment. The researchers in conjunction with the sponsors developed the quality criteria.

Results

Carpal tunnel syndrome

CTS is the most commonly diagnosed neuropathy with prevalence rates of clinically and electrophysically diagnosed CTS of 2.7% [4,5]. Within the UK, estimated prevalence rates for men are 1.2% and for women 0.9% [6]. Harrington *et al.* [2] and Sluiter *et al.* [3] have agreed upon diagnostic and surveillance criteria and the use of Phalen's tests and Tinel's test is essential in this process. However, Feuerstein and Herbert suggest that the 'gold standard' in CTS diagnosis is the use of electrodiagnostic testing and physical examination [7,8]. Sluiter *et al.* [3] also suggest a time rule in that symptoms are evident currently or on at least 4 days of the last 7.

The papers reviewed are presented in Table 1. The review has identified that in the short-term, effective treatments include local steroid injection, exercise and stretching and limited evidence for the use of ultrasound. There is currently no evidence that non-steroidal anti-inflammatory drugs (NSAIDs) are an effective treatment for CTS versus diuretics, oral steroids or a placebo [9]. The review also identified that there was little evidence to support workplace intervention strategies but this was mainly due to a lack of high quality research [8,9]. Although there is some evidence to support steroid injection as a treatment for CTS, what is appreciated is that chronic and more serious cases will result in surgical intervention.

Epicondylitis (medial and lateral)

According to a clinical review by Piligian *et al.* [10], the highest incidence of epicondylitis appears to occur in manually intensive occupations involving high work demands, for example, mechanics, wall board installation, roofing, masonry, foundries. Although there is evidence available to link forceful work and combinations of risk factors including force/repetition and force/posture, there is still minimal evidence to link epicondylitis and occupation [10,11]. In a study of 1757 workers by Descatha *et al.* [12], the prevalence of medial epicondylitis was 3.8% with an annual incidence calculated >3 years of 1.5%. Estimated prevalence rates within the UK for medial epicondylitis are 0.6% for men and 1.1% for women [6]. Estimated prevalence rates for lateral epicondylitis are 1.3% for men and 1.1% for women [6].

Harrington *et al.* [2] and Sluiter *et al.* [3] have developed diagnostic and surveillance criteria for this disorder including local pain on resisted wrist extension (lateral) or on resisted wrist flexion (medial) with the addition of the time rule by Sluiter *et al.* of symptoms present now or on at least 4 days out of the last 7.

With regard to conservative treatment of epicondylitis, the data reviewed are presented in Table 2. In the short-term, local steroid injection significantly improved symptoms; however, there is no current evidence to support the use of oral NSAIDs in treating epicondylitis [13,14]. Green *et al.* [14] did identify that topical NSAIDs gave some relief in the short-term. However, at the follow-up at 1 year, physiotherapy resulted in the main reduction in symptoms followed by a wait-and-see policy [15].

Other treatments that have been researched include iontophoresis, however, results are currently unclear for this treatment [16,17]. Again the research was affected by low numbers and confounding of results. However, the authors do report side-effects using this treatment [16]. Similar results were also found for radiation/laser therapy but this should be viewed as a last resort treatment after trying other conventional measures [18].

Shock wave therapy (also known as extracorporeal shock wave therapy, ESWT) is a treatment involving high-pressure sound waves. In the research reviewed, it was not found to be an effective treatment for epicondylitis [19–22]. Small numbers affected much of the research on this topic, however, those studies rated as good did not show shock wave therapy as effective.

Two studies were found that examined acupuncture as a treatment for elbow pain. In a study of acupuncture versus sham acupuncture, significant pain reduction and arm mobility and strength was found at 2 weeks, however, only arm function was improved at 2 months [23]. This study was rated as limited evidence due to the small numbers and the lack of a control group. Green *et al.* [24] in a systematic review of acupuncture for lateral elbow pain reviewed four randomized controlled studies. The review found that although there was some evidence to support the use of needle acupuncture 24-h post-treatment, there was insufficient evidence to support the use of laser or needle acupuncture in the treatment of elbow pain [24].

Table 1. Summary of conservative treatments for CTS

Author	Diagnostic criteria	Treatment	Outcome measures	Evidence	Quality of evidence
NSAIDs/steroids					
Giele *et al.*, 2001 [9]	Diagnostic criteria not stated	RCT of NSAIDs versus diuretics versus oral steroids versus placebo	Systematic review	Only steroid reduced symptoms	Good
Gerritsen *et al.*, 2002 [5]	Diagnostic criteria not stated	Studies included treatment via steroid injections, ultrasound, pyridoxine, NSAIDs and physical therapies	Systematic review	No current evidence that NSAIDs are more effective than placebos	Good
Gerritsen *et al.*, 2002 [5]	Diagnostic criteria not stated	Steroids (oral and injection)	Systematic review	Local injection significantly improved symptoms at 1 month	Good but no long-term follow-up
Physical therapies					
Gerritsen *et al.*, 2002 [25]	Pain, paraesthesia and/or hypaesthesia in the hand in the area innervated by the median nerve and electrophysical confirmation of symptoms	Splinting versus open carpal tunnel release RCT, $n = 176$	Follow-up 18 months; physiotherapy examination, questionnaire at 3, 6 and 12 months	At 18 months surgery had a better long-term outcome than splinting	Good but confounders in the splinting group
Davis *et al.*, 1998 [26]	Symptoms assessed by clinical examination	Chiropracty, wrist support and ultrasound versus NSAIDs and wrist supports, $n = 91$	Self-reported mental and physical distress, nerve conduction and finger sensation	No significant difference found	No evidence
Feuerstein *et al.*, 1999 [7]	Diagnostic criteria included hand pain rather than clear diagnosis of CTS	Exercise and stretching range of motion exercises versus splinting, $n = 50$	Follow-up at 1-month movement	Wrist extension significantly improved after 3 weeks	Good but short-term results
Garfinkel *et al.*, 1998 [27]	2/5 of the following: positive Tinel's test, positive Phalen's test, pain and or numbness in the median nerve distribution and sleep disturbances from hand symptoms	Yoga regimen versus wrist splint and current treatment RCT, $n = 42$	Disturbed sleep, pain intensity, Phalen's sign, Tinel's sign, grip strength and nerve conduction	Improved nerve conduction but not statistically significant	Limited evidence—small study and no control measures in the group wearing splints
Ebenbichler *et al.*, 1998 [28]	Standard electrophysiological criteria	Ultrasound randomized, double-blind, 'sham' controlled trial, $n = 34$	Subjective complaints, sensory loss, nerve conductivity and physical functioning 2 weeks, 7 weeks and 6 months	Improved nerve conduction and subjective symptoms	Limited evidence—more work required
Laser acupuncture					
Gerritsen *et al.*, 2002 [5]	Diagnostic criteria not stated		Systematic review	Limited evidence that soft laser acupuncture is more effective than placebo	Limited evidence
Workplace interventions					
Giele *et al.*, 2001 [9]	Diagnostic criteria not stated	Job change, increased rest periods, better ergonomics	Review paper	Limited evidence of efficacy of workplace interventions	No evidence due to lack of good research
Herbert *et al.*, 2000 [8]	Diagnostic criteria described including physical and electrophysical testing	Paper suggests rest, immobilization, NSAIDs, rehabilitation, education, steroid injection and workplace modification	Summary paper	No evidence provided	No evidence due to lack of good research

Table 2. Epicondylitis (medial and lateral)

Author	Diagnostic criteria	Treatment	Outcome measures	Evidence	Quality of evidence
NSAIDs					
Hay *et al.*, 1999 [13]	New onset of pain and tenderness in the lateral region of the elbow	Pragmatic RCT of steroid injection versus NSAIDs and simple analgesics, $n = 164$ new episode patients	Global assessment by participants, pain severity, pain-free grip strength (Likert scales) measured at 4 weeks and 12 months	A 2-week course of NSAIDs is no better than placebo	Good
Green *et al.*, 2002 [14]	Lateral elbow pain for >3 weeks duration	NSAIDs for treating lateral elbow pain	Cochrane Systematic Review	Some support for the use of topical NSAIDs in the short-term relief of lateral elbow pain. Insufficient evidence to support the use of oral NSAIDs	Good
Steroid injection					
Hay *et al.*, 1999 [13]	New onset of pain and tenderness in the lateral region of the elbow	Pragmatic RCT of steroid injection versus NSAIDs and simple analgesics, $n = 164$ new episode patients	Global assessment by participants, pain severity, pain-free grip strength (Likert scales) measured at 4 weeks and 12 months	Steroid injection was significantly better than NSAIDs or placebo at 4 weeks. No significant differences at 1 year	Good
Physiotherapy					
Smidt *et al.*, 2002 [15]	Pain at the lateral side of the elbow increasing with pressure on the lateral epicondyle and resisted dorsiflexion of the wrist	Physiotherapy versus steroid injection versus wait-and-see policy RCT, $n = 185$	Severity of main complaint, pain during the day, inconvenience. Severity of elbow complaints and elbow disability. Outcome measures made at 6, 12, 26 and 52 weeks	Steroid injections were best treatment in the short-term. At long-term follow-up, physiotherapy was the best treatment followed by wait-and-see policy	Good
Iontophoresis					
Nirschl *et al.*, 2003 [16]	Clinical signs leading to a diagnosis of medial or lateral epicondylitis acute symptoms	Dexamethasone sodium phosphate by iontophoresis versus placebo RCT, $n = 199$	Visual Analogue Scale (VAS) improvement rated in millimetres	Significant results in favour of iontophoresis but side-effects reported	Good
Baskurt *et al.*, 2003 [17]	Pain on the lateral epicondyle when palpated and resisted wrist extension and radial deviation that intensifies the pain	Naproxen by topical iontophoresis RCT, $n = 61$	Pain severity	No significant differences	Limited evidence—other treatment methods also used including physiotherapy so results confounded
Radiation/laser therapy					
Seegenschmiedt *et al.*, 1998 [18]	Diagnostic criteria not stated	Ionizing radiation therapy case reports, $n = 85$	Pain symptoms 1-year follow-up	Significant improvement in pain symptoms in 74% of cases	Good but treatment should only be used after conventional measures fail

Table 2. *Continued*

Author	Diagnostic criteria	Treatment	Outcome measures	Evidence	Quality of evidence
Basford JR *et al.*, 2000 [29]	Clinical examination localized pain in the proximal lateral forearm and pain with a resisted wrist	Low level laser irradiation versus placebo RCT, $n = 52$	Pain in last 24 h, benefit by patient	Treatment effective	Good but small sample
Shock wave therapy					
Rompe *et al.*, 1996 [19]	Pain in the lateral epicondyle for >12 months, pain induced by palpation of the epicondyle, resisted wrist extension, resisted finger extension and the chair test	ESWT, 3000 pulses versus 30 pulses controlled prospective study, $n = 100$	Grip strength, pain severity, palpation, chair test, resisted finger extension at 3, 6 and 24 weeks	Reduced pain and improved function in the higher pulsed group	Limited evidence, confounded by patients not blinded nor randomization effect reported
Rompe *et al.*, 2001 [20]	Pain over the lateral epicondyle for >6 months and pain in at least two of the following, palpation of the lateral epicondyle, resisted wrist extension, resisted finger extension and the chair test	ESWT and manual therapy of the cervical spine versus ESWT in chronic cases. Prospective single-blind controlled study, $n = 127$	Pain measures: the Roles and Maudsley outcome score at 12 months	No significant difference between groups—both showed a significant improvement	Limited evidence, lack of control on ESWT and cervical manipulation. Patients not randomized
Haake *et al.*, 2002 [21]	Local pain above the lateral epicondyle, pain on wrist extension and finger extension	ESWT and local anaesthesia versus placebo and anaesthesia. Prospective randomized placebo controlled trial, $n = 246$	Pain measures: the Roles and Maudsley at 12 weeks and 12-month follow-up	No significant differences between the groups and improvement observed in two-thirds of patients at 12 months	Good, no evidence that ESWT is better than a placebo
Melikyan *et al.*, 2003 [22]	Pain localized on the lateral epicondyle, increased pain with resisted wrist extension and elbow extension with full wrist flexion	ESWT versus placebo. Randomized double-blind placebo-controlled study, $n = 74$	Disabilities questionnaire, grip strength, pain, analgesic usage and rate of progression to surgery	No significant differences between groups	Good, no evidence that ESWT is better than a placebo
Acupuncture					
Fink *et al.*, 2002 [23]	Clinical examination made of each participant assessing pain on the radial epicondyle aggravated with resisted wrist extension and positive mid-finger test	Acupuncture versus sham acupuncture RCT investigator and patient blinded, $n = 55$	Maximal strength, pain intensity and disability scale at 2 weeks and 2 months post-treatment	At 2 weeks, significantly reduced pain intensity and increased arm function and strength. At 2 months, only the arm function was significantly improved	Limited evidence—no control group and small numbers
Green *et al.*, 2002 [24]	Lateral elbow pain for >3 weeks duration	Cochrane Review on acupuncture for treating lateral elbow pain	Systematic review	Four RCTs reviewed. Some evidence to support needle acupuncture in the short-term—24 h	Insufficient evidence to support or refute the use of needle or laser acupuncture

Disorders of the shoulder

Rotator cuff syndrome and bicipital tendonitis

In a Finnish survey of a nationally representative sample of persons aged ≥30 years, the prevalence of chronic rotator cuff tendonitis and non-specific shoulder pain were 2.0% (78 of 3909 subjects) and 12% (410 of 3525 subjects), respectively [30]. Within the UK, the prevalence estimates for rotator cuff syndrome have been calculated at 4.5% among men and 6.1% among women with prevalence estimates for bicipital tendonitis at 0.7% (in both sexes) [6].

Agreed diagnostic and surveillance criteria have been suggested by Harrington *et al.* [2] and Sluiter *et al.* [3] with symptoms including inflammation or degeneration of the rotator cuff or biceps and pain in the shoulder region worsened by elevation movement such as scratching of the upper back. Sluiter *et al.* also consider the time rule of symptoms now or on at least 4 days of the last 7 [3].

Two papers were identified that examined conservative treatments of rotator cuff syndrome and bicipital tendonitis and are presented in Table 3. The first study examined the impact of physical therapy, local steroid injection and NSAIDs by measuring 14 clinical outcomes at 6 and 18 months [31]. The authors suggest that patients should undergo 18 months of conservative treatment before surgery is considered. However, the evidence is limited due to the questionable study design and the small numbers. Green *et al.* [32] carried out a Cochrane Review for interventions on shoulder pain. The evidence identified in the review was that NSAIDs and subacromial steroid injection might improve the range of movement in the rotator cuff more than a placebo. This paper highlights the lack of good quality research in this area.

The evidence for conservative treatment of rotator cuff syndrome and bicipital tendonitis is unclear. This is the result of a lack of agreement in diagnostic criteria in previous research and a lack of clarity in treatment methodologies and low quality research.

Shoulder capsulitis

A prevalence of 2–3% has been quoted as the population rate for shoulder capsulitis in textbooks but Walker-Bone *et al.* [33] found no recent population-based data in their review. Harrington *et al.* [2] have suggested diagnostic and surveillance criteria for shoulder capsulitis, with symptoms including current or past pain in the upper arm with restriction of glenohumeral movement in a capsular pattern. Nicholson [34] suggests that the criteria and classification of this disorder is still under investigation.

Gam *et al.* [35] found in a randomized controlled trial (RCT) comparing steroid injection versus steroid injection and distension that functional movement improved and analgesic use decreased in a small study. In 32 patients, de Jong *et al.* [36] found that when assessing injected dosage of triamcinolone acetonide, the higher dose of 40 versus 25 mg resulted in a significant reduction in pain, sleep disturbance and increased functional movement. However, both these studies only give limited evidence on the efficacy of the treatments assessed due to the small numbers of participants. In a Cochrane Review by Green *et al.* [32], there was little evidence found to support or refute the use of conservative treatments for shoulder capsulitis.

Impingement syndrome

No data were found on prevalence rates for the general population for impingement syndrome. However, one study calculated the prevalence ratio for shoulder impingement syndrome at 5.27 (95% CI 2.09–12.26) among currently working and 7.90 (95% CI 2.94–21.18) among former slaughterhouse workers [37].

There has been no consensus agreement made with regard to diagnostic criteria for impingement syndrome. However, Ludewig and Borstad [38], Ludewig and Cook [39] and Bigliani [40] all refer to a 1983 paper by Neer which gives a definition of impingement syndrome as 'the compression and irritation of the rotator cuff as they pass beneath the coracoacromial arch during arm elevation'. Symptoms include pain in the anterosuperior part of the shoulder [40].

Four research studies were identified that examined conservative treatment of impingement syndrome and are summarized in Table 3. The use of physical therapy and NSAIDs was assessed by Morrison [41]. The study found that using the treatments, 67% of the sample had a satisfactory outcome and 28% were recommended for surgery. However, the evidence is rated as poor as the follow-up for participants ranged from 6 to 81 months. The same issue affected a second study which examined the short-term efficacy of subacromial steroid injection [42]. The study was a RCT with small numbers and the outcome measures included pain scores, physical examination and functional movement. At the most recent follow-up, pain scores had been significantly reduced and movement had increased. Again this was rated as limited evidence due to inconsistent follow-up times.

One further intervention was a home exercise programme for construction workers [38]. This was a RCT that used a shoulder-rating questionnaire pre- and post-treatment. The study found a significant improvement in the intervention group versus the control group but was rated as limited evidence due to the small numbers studied.

Desmeules *et al.* [43] carried out a systematic review of RCTs for therapeutic exercise and manual therapy. The review identified that there was limited evidence for the use of these treatments. The study also highlighted that there are issues of methodological quality in this research that results in an inability to decide on the efficacy of conservative treatments.

Table 3. Summary of conservative treatments for disorders of the shoulder

Author	Diagnostic criteria	Treatment	Outcome measures	Evidence	Quality of evidence
Rotator cuff syndrome and bicipital tendonitis					
NSAIDs					
Bartolozzi *et al.*, 1994 [31]	Radiography, magnetic resonance imaging scan and clinical examination including a painful arc, positive impingement sign and specific rotator cuff weakness	Combined treatments included physical therapy, local steroid injection and NSAIDs. Treatments not randomized, $n = 136$	14 clinical outcome measures at 6 and 18 months	At 6 months, 46% of patients had excellent or good results; at 18 months, 47/68 patients diagnosed with chronic impingement syndrome suggests patients should undergo 18 months of conservative treatment	Limited as design questionable and numbers small. Paper unclear on how patients were allocated
Green *et al.*, 2005 [32]	Pain arising from the shoulder in the adult population	Interventions for shoulder pain	Cochrane Systematic Review	NSAIDs and subacromial steroid injection may improve range of movement in rotator cuff syndrome more than a placebo	Limited evidence—more good quality research needed
Shoulder capsulitis					
Steroid injection					
Gam *et al.*, 1998 [35]	Symptoms for >6 weeks, worsening of pain at night and passive range of external rotation <50% of the opposite shoulder	Distension and glucorticoid versus glucorticoid alone RCT, $n = 20$	Functional movement, pain, daily use of analgesics at 3, 6 and 12 weeks	Improvement in functional movement and decrease in analgesic use with shoulder distension and glucorticoid	Small sample—more research required
de Jong *et al.*, 1998 [36]	Shoulder or arm pain, restriction of motion of the glenohumeral joint, pain at night and no other clinical or radiological evidence for symptoms	10 versus 40 mg triamcinolone acetonide injection. Randomized double-blind clinical trial, $n = 32$	Pain, sleep disturbance, functional movement	Significant reduction in pain and functional impairment in the high-dose group. Higher dose level more effective but this may not be the optimum dosage	Limited evidence—small numbers
Green *et al.*, 2005 [32]	Pain arising from the shoulder in the adult population	Interventions for shoulder pain six trials reviewed for shoulder capsulitis	Cochrane Systematic Review	Lack of uniformity in diagnosis	Little evidence to support or refute efficacy of conservative treatments for shoulder capsulitis
Impingement syndrome					
Morrison *et al.*, 1997 [41]	Patient history, clinical examination and a positive impingement sign	Retrospective study of 616 patients conservatively managed via physical therapy and NSAIDs	Shoulder-Rating Scale of the University of California, Los Angeles	At follow-up appointments, 67% of patients had a satisfactory outcome and 28% were recommended for surgery	Limited evidence—inconsistent follow-up times ranging from 6 to 81 months
Ludewig PM *et al.*, 2003 [44]	History of shoulder pain localized to the glenohumeral joint and two positive shoulder impingement tests	Home exercise programme for construction workers participants randomly allocated. treatment group, $n = 35$; control group, $n = 33$; asymptomatic group, $n = 25$	Shoulder-Rating Questionnaire pre- and post-treatment between 8 and 12 weeks	Significant improvement in treatment group versus control group	Limited evidence. Small numbers involved in the study

Table 3. *Continued*

Author	Diagnostic criteria	Treatment	Outcome measures	Evidence	Quality of evidence
Blair *et al.*, 1996 [42]	Symptoms for >3 months, diagnosis based on the lidocaine injection test, previous injections of corticosteroids, no other evidence of tears to the rotator cuff	Short-term efficacy of subacromial steroid injection RCT, n = 40; treatment group, n = 19; control group, n = 21	Pain scores, physical examination and functional status	At most recent follow-up appointment, pain score significantly reduced and a significant increase in movement	Limited evidence. No consistency in follow-up as time ranged between 12 and 55 weeks
Desmeules *et al.*, 2003 [43]	Diagnostic criteria not included	Therapeutic exercise and manual therapy	Systematic Review of RCTs	Eight studies reviewed	Limited evidence for the use of therapeutic exercise and manual therapy. Methodological issues in research reviewed; further research required

Tension neck

Although there is no consensus agreement for the diagnosis or surveillance criteria for tension neck, a number of authors have used this term. Helliwell [45] describes a definition used by Viikari-Juntura (1987), which is 'a feeling of fatigue or stiffness in the neck, neck pain or headache radiating from the neck'. Helliwell also describes signs of two tender spots or palpable hardenings. Mekhora *et al.* [46] have summarized the disorder and describe it as a type of occupational cervicobrachial syndrome that can be work related. However, Mekhora *et al.* also point out that tension neck syndrome must be differentiated from joint or neurologically based neck problems; symptoms include constant muscle fatigue, stiffness in the neck and shoulder areas and agreeing with Helliwell, two tender spots or trigger points. This syndrome is not related to whiplash injuries.

Very little data are available on the prevalence or incidence of tension neck syndrome. In a study among frequent computer users, the prevalence rate ratio for tension neck syndrome was 3.5 (95% CI 1.0–12) for 25–29 h/week of mouse use and increased to 4.7 (95% CI 1.2–18) for >30 h/week of mouse use [47].

Two studies were identified for conservative treatment of tension neck and are presented in Table 4. The first was a randomised controlled pre- and post-test study of computer users and ergonomics intervention [46]. The outcome measures included the validated Nordic Musculoskeletal Questionnaire, a discomfort scale and measurement of workload. From the data, discomfort measures were significantly reduced post-intervention. The data were confounded by a lack of measurement of the different workloads within the sample but it does offer limited evidence that ergonomic interventions may reduce discomfort. The second study reviewed was an evaluation of a physical training course in bank workers [48]. The research was a controlled intervention with a 4-week physical training given to the first group with diagnosed tension neck. The results found no significant differences between the treatment and the control group that indicates physical training does not have an impact on tension neck. However, further research on a larger sample, including psychosocial factors, would be helpful.

Disorders with no current effective conservative treatment

Table 5 is a summary table for those disorders where there is currently no evidence to support conservative treatments. With regards to tenosynovitis and flexor-extensor peritendonitis, diagnostic and surveillance criteria have been agreed by both Harrington *et al.* [2] and Sluiter *et al.* [3]. Prevalence rates of tenosynovitis of the wrist within the UK population have been estimated at 1.1% for men and 2.2% for women [6].

Table 4. Summary of conservative treatment of tension neck

Author	Diagnostic criteria	Treatment	Outcome measures	Evidence	Quality of evidence
Mekhora *et al.*, 2000 [46]	No history of surgery or accident-related symptoms, no neurological diseases or spinal disorders. No improvement in symptoms in the previous 3 months and discomfort or pain which recovered overnight	Ergonomic interventions for computer users pre- and post-study with delayed intervention for the second group RCT, $n = 470$	Discomfort measures	Significant reduction in discomfort measures post-intervention	Limited evidence that ergonomic intervention can reduce discomfort for tension neck sufferers
Klemetti *et al.*, 1997 [48]	The neck and shoulder disability questionnaire	Physical training treatment group diagnosed with tension neck $n = 74$ versus control group diagnosed with tension neck but no intervention	Postal questionnaire 6 months after intervention	No significant differences between groups at 6 months follow-up	No evidence that physical training has an impact on tension neck—research required

Two papers were identified which examined medical management of tenosynovitis [10,49]. Recommendations included removal from current job, rest, arm supports including slings, hand supports, NSAIDs, physiotherapy or hand therapy and workplace modifications. However, neither of the papers reviewed identified any evidence to support or refute conservative treatment of tenosynovitis.

Neither diagnostic criteria nor surveillance criteria have been agreed upon for tendonitis of the wrist or forearm. However, from Sports Medicine it has been defined as an inflammation of the tendon and tendon-muscle attachments [3,10,50]. Prevalence or incidence rates of hand/wrist tendonitis have been found to range from 4 to 56% in groups subjected to workplace exposures and from 0 to 14% in unexposed groups, probably due to variability in diagnostic criteria and workplace exposures [11]. Symptoms include pain in the affected tendon and for extensor tendonitis, pain worsened by finger extension against resistance; for flexor tendonitis, pain associated with wrist flexion and ulnar deviation especially against resistance [10]. Only one paper was identified that examined conservative treatments for tendonitis [10]. However, the paper was a summary paper and gave no evidence to support the use of conservative treatments for tendonitis of the wrist or forearm.

With regard to de Quervain's disease, diagnostic and surveillance criteria have again been agreed upon by Harrington *et al.* [2] and Sluiter *et al.* [3] including pain or tenderness over the radial side of the wrist and pain reproduced by resisted thumb extension or abduction or a Finkelstein's test. Sluiter *et al.* [3] also suggest a time rule of current symptoms or on at least 4 days out of the last 7 days. Estimated prevalence data from the UK suggest that within the general population, de Quervain's disease exists at a rate of 0.5% among men and 1.3% among women [6].

Two papers were identified that researched conservative treatment of de Quervain's disease. However, no evidence was provided by Piligian *et al.* [10] to support the use of conservative treatments. Richie *et al.* [51] carried out a pooled qualitative literature evaluation of seven studies ($n = 459$ wrists), where they found that the most effective treatment was a steroid injection (83% cured). The combination of splinting and injection resulted in greater treatment failure (39%) than injection alone (17%). However, the results must be viewed cautiously as they are based on descriptive studies with no control on possible confounding variables.

Diffuse non-specific ULDs have been the topic of much discussion but different groups have agreed on diagnostic criteria for them. The symptoms include pain in the forearm, muscles, tendons, nerves or joints without a specific pathology [2,3]. However, Palmer *et al.* [52], have suggested additional symptoms including loss of function, weakness, cramp, muscle tenderness, allodynia

Table 5. Disorders with no evidence of effective conservative treatment

Author	Diagnostic criteria	Treatment	Outcome measures	Evidence	Quality of evidence
Tenosynovitis and flexor-extensor peritendonitis					
Payling KJ. 1993 [49]	No diagnostic criteria included	Review paper recommending various options including removal from current job, rest, arm support, casts and physiotherapy	Review		No evidence given to support or refute conservative treatment
Piligian *et al.*, 2000 [10]	Pain in the affected tendons worsened by wrist- or finger-resisted extension	Workplace modification, rest, NSAIDs, analgesics and physical therapy	Review		No evidence given to support or refute conservative treatment
Tendonitis of the wrist and forearm					
Piligian *et al.*, 2000 [10]	Pain in the affected tendons worsened by wrist- or finger-resisted extension	Workplace risk assessment and work modification, rest, NSAIDs			No evidence given to support or refute conservative treatment
de Quervain's disease					
Piligian *et al.*, 2000 [10]	Pain, tenderness and/or swelling over the radial styloid, worsened by abduction and extension of the thumb positive Finkelstein's manoeuvre	Worksite modification, rest, NSAIDs, analgesics, wrist splinting	Review		No evidence given to support or refute conservative treatment
Richie CA *et al.*, 2003 [51]	Pain at the radial wrist, tenderness at the first dorsal wrist compartment and a positive Finkelstein's manoeuvre	Pooled qualitative literature review	Review	Most effective treatment steroid injection	Limited evidence as based on descriptive studies not RCTs
Diffuse non-specific ULDs					
Lindh *et al.*, 1997 [53]	Previous diagnosis of non-specific symptoms, chronic musculoskeletal pain, fybromyalgia	Multidisciplinary rehabilitation RCT Treatment group, $n = 158$; control group, $n = 226$	Return to work, contact with the Work Evaluation Unit or medical incapacity	No significant differences between treatment and control group	No evidence to support or refute conservative treatment of non-specific ULDs

Table 6. Summary of pain management programmes for treatment of ULDs

Author	Diagnostic criteria	Treatment	Outcome measures	Evidence	Quality of evidence
Johansson *et al.*, 1998 [56]	Chronic musculoskeletal pain which significantly disrupted life	Cognitive behavioural programme. First stage of study, $n = 36$; second stage of study, $n = 85$. Randomized controlled outcome study	First stage of study, follow-up at 1 month. Second stage of study, follow-up at 1 year occupational activity sickness absence	Occupational activity significantly increased at 1 month in the treatment group. No difference at 1 month for sickness absence. At 1-year follow-up, significant reduction in pain intensity and severity, interference and life control measures sickness absence decreased significantly	Limited evidence. Small numbers
Marhold *et al.*, 2001 [57]	Musculoskeletal pain	Cognitive behavioural therapy for individuals with chronic back, neck and shoulder pain, $n = 72$. Randomized crossover 2×2 design	Sickness absence pre-treatment 2 months post-treatment 4 months post-treatment 6 months post-treatment	Significant decrease in short-term sickness absence. No significant differences in long-term sickness absence	Limited evidence for impact in short-term sickness absence
Karjalainen *et al.*, 2000 [58]	Working age adults suffering from upper-extremity repetitive strain injury (RSI)	EMG biofeedback relaxation imagery versus EMG biofeedback and relaxation versus relaxation, $n = 48$.	Pain intensity measures	No significant differences	Limited evidence. Issue of poor study design
	Review paper including two papers	Hypnosis with biofeedback and autogenics, $n = 32$	Pain intensity on VAS	Pain intensity significantly lowered in the intervention group	Limited evidence. Issue of poor study design

and slowing of fine movements. One randomised controlled study was identified for rehabilitation of individuals with non-specific musculoskeletal pain [53]. The study included 158 patients with a control group of 226 patients. A multidisciplinary rehabilitation approach was used including, patient evaluation by a physician, including an interview, a review of previous investigations and physical examination where necessary. No significant differences were found between the treatment and control group indicating that multidisciplinary rehabilitation is not effective in the management of non-specific ULDs. No further research studies were identified to support or refute conservative treatment of this particular disorder.

General management of work-related musculoskeletal disorders

Two papers were identified relating to general management of musculoskeletal disorders. The paper by O'Neil suggests treatments or chronic tendon injuries including rest, ice, compression and elevation but there is no evidence to support these suggestions [54]. The second paper was an educational paper and does summarize information available at the time, however, again there is no evidence to support the suggested treatments [55]. The lack of papers with regard to general clinical management of ULDs is not surprising as each disorder has its own diagnosis and aetiology and it would be unlikely that a generalized approach would help clinical management. O'Neil *et al.* [54] did identify that the prognosis is less good for those individuals with a longer duration of symptoms.

Pain management programmes

Three papers were identified in this field relating to musculoskeletal problem and are presented in Table 6. The studies included in the review were two randomized crossover design studies where the intervention included a cognitive behavioural programme [56,57]. The studies identified an increase in occupational activity, reduction in pain intensity and severity and a significant decrease in sickness absence at 1-year follow-up [56]. However, this was not replicated in the study of Marhold *et al.* [57] where there was a significant decrease in short-term

sickness absence only, not in those individuals with long-term sickness absence. In a review of the effectiveness of biopsychosocial rehabilitation on repetitive strain injuries, Karjalainen *et al.* [58] reviewed two studies. The first study did not find significant differences in pain intensity measures for electromyography (EMG) biofeedback, relaxation and imagery. The second paper did find pain intensity significantly reduced using hypnosis with biofeedback and autogenics. However, poor study design and low numbers affected both papers reviewed.

These studies highlight that cognitive behavioural therapies can improve occupational outcomes in the short-term and result in a significant decrease in sickness absence at 1 year but where there is earlier intervention, the outcome is better.

Discussion

The evidence for conservative treatment options for ULDs ranged from good to no current evidence to support specific treatments. This was either due to a lack of research on the topic or the quality of the research projects carried out. What also impacts on the collation of information on conservative treatment of ULDs is the lack of cohesion in the use of diagnostic criteria. It would be hoped that future research ensures consistency in diagnosis of specific disorders.

For specific disorders, a number of effective treatments were identified including steroids and steroid injection for CTS in the short-term. However, there was no evidence found to support the use of NSAIDs, chiropracty, wrist supports or yoga; there was some evidence found to support the use of range of motion exercises in the short-term and limited evidence for the use of ultrasound treatment, laser acupuncture and workplace interventions.

The review identified no evidence on whether withdrawal from hand guided vibratory tool use or exclusion of aggravating postures leads to CTS symptom resolution. There is evidence supporting an association between exposure to vibration and CTS but the evidence to demonstrate that awkward postures alone are associated with CTS is insufficient [11]. Furthermore, it has been suggested that CTS symptoms in a worker who has worked with vibrating tools for many years pose a diagnostic challenge as a diagnosis of HAVS or co-diagnosis of HAVS should also be considered [59].

For epicondylitis, again no evidence was found to support the use of NSAIDs but one study identified that the use of topical NSAIDs could improve symptoms. In the short-term, steroid injections were found to be an effective treatment for epicondylitis but little evidence was found to support iontophoresis. Radiation therapy has also been assessed and is recommended only after other conventional measures fail. The review did not find support for the use of shock wave therapy and only limited evidence for the use of needle or laser acupuncture.

For treatment of different shoulder disorders, the review found limited evidence for the effectiveness of NSAIDs and steroid injection to treat rotator cuff tendonitis and bicipital tendonitis. Limited to no evidence was found to support conservative treatments of shoulder capsulitis. Where impingement syndrome was evaluated, again limited evidence was found to support home exercise programmes and manual therapy.

Two papers were identified that examined intervention studies for tension neck syndrome. The papers identified that there is limited evidence to support the use of ergonomics intervention for tension neck syndrome but physical training programmes were not found to improve symptoms.

For the disorders of tenosynovitis, tendonitis of the wrist or forearm, de Quervain's disease or diffuse non-specific ULDs, no research was identified to support or refute the use of conservative treatments. Furthermore, it has been suggested that 'tendinopathy' rather than 'tendinitis' may be a more appropriate term to describe common painful overuse tendon conditions as light microscopy of patients operated on for tendon pain has commonly revealed tendinosis, a degenerative rather than an inflammatory disorder [50–61]. Accordingly, the effects of anti-inflammatory medication treatment for these conditions require further research.

Pain management programmes did give limited evidence in the short-term for reducing sickness absence and highlighted the need for intervention earlier in ULDs rather than later.

The review has identified a large data gap in conservative treatments for ULDs. This is possibly as a result of the only recent agreement on diagnostic and surveillance criteria that can then be used in research projects. Future research must address the methodological design issues found in many studies to develop a stronger evidence-base for the treatment of these disorders.

Key points

- There is evidence of the efficacy of conservative treatments for CTS, epicondylitis, rotator cuff tendonitis, bicipital tendonitis and tension neck syndrome.
- No evidence was found to support or refute conservative treatment of tenosynovitis, tendonitis, de Quervain's disease or diffuse non-specific ULDs.
- To obtain further evidence, future research needs to address issues including poor methodological design, small numbers and lack of controls.

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Conflicts of interest

None declared.

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