



**AOTA Critically Appraised Topics and Papers Series**  
**Occupational Therapy and  
Clinical Conditions Related to  
Workers' Compensation**

*\*A product of the American Occupational Therapy Association's  
Evidence-Based Literature Review Project*

**CRITICALLY APPRAISED TOPIC (CAT)**

***Focused Question***

**What occupational therapy interventions are effective in the rehabilitation of individuals with work-related injuries/clinical conditions of the shoulder?**

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**Clinical Scenario:**

The shoulder complex is an intricate arrangement of bones, joints, nerves, and muscles that facilitates functional range of motion of the upper extremity. This complex sacrifices inherent joint stability to allow maximal levels of mobility, optimizing the position of the elbow, wrist, forearm, and hand for activities of daily living (ADL), instrumental activities of daily living (IADLs), work, education, and leisure. Dynamic stability is afforded to this joint through the rotator cuff musculature, a group of four muscles located in tight approximation to the glenohumeral joint. The positioning of these muscles as they relate to several bony prominences, including the narrow subacromial space, increases the risk for impingement-related syndromes. Patients with chronic, acute, and postoperative shoulder diagnoses are commonly referred to occupational therapists working in inpatient, outpatient, home health, and industrial practice areas. These diagnoses include, but are not limited to, shoulder pain, frozen shoulder (also termed adhesive capsulitis), rotator cuff tears, shoulder instability, anterior dislocation, proximal humerus fractures, subacromial impingement syndromes, and thoracic outlet syndrome.

Various types of interventions are utilized by occupational therapists and occupational therapy assistants to treat conditions of the shoulder complex. These range from preparatory activities, such as modalities and range of motion, to occupation-based interventions focusing on client-centered roles and goals. Interventions are implemented both in a preventive fashion and in response to acute, chronic, and postoperative symptomology. An occupation-based and client-centered approach to evaluation and treatment as afforded by an occupational therapist offers the patient an opportunity to return to valued daily life activities and occupations.

**Summary of Key Findings:**

Summary of Levels I, II, and III

All research included in this review are Level I, II, and III studies. Results of these studies have been organized into types of interventions, including range of motion/exercise, conservative management, joint mobilization, laser, electromyography (EMG) feedback, pulsed electromagnetic field, the Cyriax method, ultrasound, and multidisciplinary biopsychosocial

rehabilitation. The interventions included here are within the scope of occupational therapy practice in the rehabilitation of individuals with work-related injuries and clinical conditions of the shoulder.

#### RANGE OF MOTION/EXERCISE

- Four Level I systematic reviews found weak evidence to support range of motion for patients with rotator cuff tears, shoulder instability, proximal humerus fractures, and subacromial impingement syndrome. Weak evidence was found to support exercise and mobilization, as well as supervised exercise, for patients following rotator cuff tears (Green, Buchbinder, & Hetrick, 2003). In cases of shoulder instability, Gibson, Growse, Korda, Wray, and MacDermid (2004) found weak support for a conservative program including 3 to 4 weeks of immobilization followed by 12 weeks of range of motion and stability exercises. According to Handoll, Gibson, and Madhok (2003), early therapeutic intervention without immobilization may be appropriate for specific, non-displaced fractures as directed by an occupational therapist (Handoll et al., 2003). For patients with subacromial impingement syndrome, limited evidence was found to support nonsurgical and nonpharmacologic rehabilitation, including exercise and joint mobilizations (Michener, Walsworth, & Burnet, 2004).
- One Level I systematic review did not support or refute the use of exercise for patients with rotator cuff pathology (Grant, Arthur, & Pichora, 2004).
- Three Level I randomized controlled trials assessed exercise for patients with trapezius myalgia and chronic neck/shoulder pain. According to the study performed by Waling, Sundelin, Ahlgren, and Jarvholm (2000), there is limited evidence to support the efficacy of exercise programs to reduce pain for patients with work-related trapezius myalgia. Gereats et al. (2005) espoused a behavioral, graded exercise therapy program as having minimally greater benefit for the restoration of ADL activities compared with usual care as chosen by general practitioners for patients with chronic shoulder pain. No significant difference was found between intensive and lighter training for patients with chronic neck and shoulder pain in a study by Randlov et al. (1998); both treatments were beneficial in improving participation in activities of daily living.
- Two Level II studies addressed gradation of exercise for patients with head and neck symptoms and frozen shoulder. Limited evidence was found to support the use of daily, light resistance training as guided by a therapist to decrease head and neck symptoms and increase shoulder extension strength (Sjogren et al., 2005). Less aggressive techniques, including exercises completed only within a painless range, were more effective for idiopathic frozen shoulder than techniques that surpassed the pain threshold; however, both groups required 12 months to achieve pain-free glenohumeral range of motion (Diercks & Stevens, 2004).
- In a Level III study regarding thoracic outlet syndrome, a home exercise program was found to decrease pain in the proximal regions of the body (Novak, Collins, & Mackinnon, 1995).

#### CONSERVATIVE MANAGEMENT

- Two Level I systematic reviews returned divergent outcomes for patients with rotator cuff tears versus those with shoulder instability. Little evidence was found to support or refute surgical versus conservative management for patients with rotator cuff tears (Ejnisman et al., 2004); however, weak support for a conservative program including 3 to 4 weeks of immobilization followed by 12 weeks of range of motion and stability exercises was found for patients with shoulder instability (Gibson et al., 2004). It is important to note that the authors did not encourage the recommendation of a conservative method over surgical intervention for decreasing recurrence (Gibson et al., 2004).

- One Level III study supported conservative management for the treatment of thoracic outlet syndrome (Novak et al., 1995).

#### JOINT MOBILIZATION

- One Level I systematic review found limited evidence to support nonsurgical and nonpharmacologic rehabilitation for patients with subacromial impingement syndrome, including exercise and joint mobilizations (Michener et al., 2004).
- One Level I randomized controlled trial found limited evidence to support the efficacy of high- versus low-grade mobilization techniques for the improvement of mobility and decreased self-reported disability in patients with adhesive capsulitis (Vermeulen, Rozing, Obermann, le Cessie, & Vliet Vleland, 2006).

#### LASER

- One Level I systematic review found weak evidence to support laser treatment for patients with adhesive capsulitis and weak evidence against the use of laser and therapy instead of corticosteroid injections for patients with rotator cuff tears (Green et al., 2003).
- In a Level I randomized controlled trial, low-power gallium arsenide laser treatment was not found to be more effective than therapeutic activity after 10 sessions in a 2-week period for patients with shoulder pain (Bingol, Altan, & Yurtkuran, 2005).
- One Level I systematic review found laser treatment to be beneficial when used in isolation on patients with subacromial impingement syndrome (Michener et al., 2004).

#### EMG FEEDBACK

- In a systematic review of treatment for shoulder instability, EMG feedback was weakly recommended as an adjunctive modality (Gibson et al., 2004).

#### PULSED ELECTROMAGNETIC FIELD

- In a systematic review, weak evidence was found to support pulsed electromagnetic field for patients with both calcific tendonitis and rotator cuff tears (Green et al., 2003).
- One Level I systematic review did not support or refute the use of electrotherapy for patients with rotator cuff pathology (Grant et al., 2004).

#### CYRIAX METHOD

- In Level I randomized comparative prospective clinical trial, the Cyriax method, including deep friction massage and joint manipulations, was found to produce significantly greater changes in glenohumeral flexion, rotations, and pain in a significantly decreased treatment time compared with standard intervention using superficial and deep heat treatments for patients with adhesive capsulitis (Guler-Uysal & Kozanoglu, 2004).

#### ULTRASOUND

- In a systematic review, weak evidence was found to support ultrasound for patients with calcific tendonitis (Green et al., 2003).
- One Level I systematic review did not support the use of ultrasound for patients with subacromial impingement syndrome (Michener et al., 2004).

#### MULTIDISCIPLINARY BIOPSYCHOSOCIAL REHABILITATION

- One Level I systematic review found little scientific evidence to support multidisciplinary biopsychosocial rehabilitation for working-age adults with neck and shoulder pain (Karjalainen et al., 2005).

## Summary of Levels IV and V

N/A

## Contributions of Qualitative Studies:

N/A

## Bottom Line for Occupational Therapy Practice:

This systematic review provides support for the use of multiple types of interventions used by occupational therapy practitioners to treat conditions of the shoulder complex. The majority of interventions covered in this review are defined as preparatory activities, or those that prepare patients for occupational performance. It is of the utmost importance to recognize that these interventions represent a limited component of the types of interventions utilized by occupational therapy practitioners. Purposeful and occupation-based activities should be utilized to facilitate a holistic treatment plan that focuses on return to ADL, IADL, work, education, and leisure.

Preparatory activities as supported in this review included range of motion and exercise, conservative management, joint mobilization, laser, EMG feedback, pulsed electromagnetic field, the Cyriax method, and ultrasound. Range of motion and exercise were supported for patients with rotator cuff tears, shoulder instability, proximal humeral fractures, subacromial impingement syndrome, trapezius myalgia, chronic neck/shoulder pain, frozen shoulder, and thoracic outlet syndrome. Joint mobilizations were supported for patients with subacromial impingement syndrome and adhesive capsulitis. In this literature review, laser treatments were supported only for patients with adhesive capsulitis; laser treatments were not found to be more effective for patients with rotator cuff tears and shoulder pain than alternative. Weak evidence was found to support both EMG feedback for patients with shoulder instability and pulsed electromagnetic field for patients with calcific tendonitis and rotator cuff tears. The Cyriax method of deep friction massage and joint manipulations was found to be beneficial in terms of motion, pain, and treatment time for patients with adhesive capsulitis. Finally, ultrasound was weakly supported for the diagnosis of calcific tendonitis.

When comparing the benefits of surgical versus conservative management, the implementation of occupational therapy intervention was supported for patients with shoulder instability, subacromial impingement syndrome, and thoracic outlet syndrome.

## Review Process:

Procedures for the selection and appraisal of articles

## Inclusion Criteria:

- Intervention approach used in the rehabilitation of work-related injuries and clinical conditions of the shoulder
- Peer-reviewed journal article
- Published in an English language journal
- Addressed an intervention approach within the domain of occupational therapy.
- Level I, Level II, and Level III studies

**Exclusion Criteria:**

- Studies outside the domain of occupational therapy
- Published before 1986
- Level IV and Level V studies
- Studies included qualitative methods without quantitative methods
- Non-English language journal

*Search Strategy*

Categories	Key Search Terms
Patient/Client Population	Shoulder, shoulder pain, shoulder joint, axilla, glenohumeral joint, scapulothoracic articulation, brachial plexus injury, athletic injuries—shoulder, wounds and injuries—shoulder, degenerative joint disease, adhesive capsulitis, rotator cuff syndrome, sprains and strains—rotator cuff, shoulder tendonitis, bicipital tendonitis, subacromial bursitis, shoulder impingement, rotator cuff tear, calcific shoulder, fracture anatomical head humerus, fracture greater tuberosity humerus—open, fracture humerus shaft—closed, dislocation—glenohumeral, shoulder strain, crushing injury—upper arm, complex regional pain syndrome, reflex sympathetic dystrophy
Intervention	Treatment, rehabilitation, interventions, therapy, occupational therapy, exercise, physical agent modalities, physical therapy, sports medicine, athletic training, body mechanics, ergonomics, relaxation techniques, biofeedback, prevention, functional training, activities of daily living, adaptive equipment, work hardening, work reconditioning/conditioning, industrial rehabilitation, occupational medicine, energy conservation, social skills training, cognitive behavior therapy, job coaching, job modification, job retraining, occupational rehabilitation, edema control, therapeutic management, joint protection, scapulohumeral rhythm, artrokinematics.
Comparison	Filters based on those developed by the Miner Library at the University of Rochester
Outcomes	Return to work, disability, level of independence (ADLs, IADLs), absenteeism, physical mobility, functional/work capacity evaluation, quality of life, coping patterns, prosthetic use, pain, dysfunction/function, sickness, fatigue, endurance, strength, dynamometry, range of motion (ROM), electromyography (EMG), nerve conduction velocity (NCV), pinch strength, grip strength, sensation, coordination, weakness, volumetric measurement for edema, circumferential measurement for edema, depression, anxiety, psychological distress, fear, symptom magnification, occupational stress.

<b>Databases and Sites Searched</b>
Medline, CINAHL, Ergonomics Abstracts, PsychInfo, OT Seeker, Pedro, TRIP, RehabData, BIOSIS Preview, Science Citation Index, Social Work Abstracts, Healthstar, NIOSHTIC-2

***Quality Control/Peer Review Process:***

Advisory group from within and outside occupational therapy reviewed focused questions and search terms (including diagnoses) developed by an AOTA consultant and AOTA staff.

The review author, AOTA consultant, and AOTA staff, in conjunction with a medical librarian with experience in evidence-based reviews, were responsible for searching the literature, selecting research studies of relevance to occupational therapy, critically appraising the studies, and summarizing the information with emphasis on implications for occupational therapy practitioners.

The CAT was developed by the review author and reviewed by AOTA consultant and AOTA staff.

**Results of Search:**

***Summary of Study Designs of Articles Selected for Appraisal***

<b>Level of Evidence</b>	<b>Study Design/Methodology of Selected Articles</b>	<b>Number of Articles Selected</b>
I	Systematic reviews, meta-analysis, randomized controlled trials	23
II	Two groups, nonrandomized studies (e.g., cohort, case-control)	3
III	One group, nonrandomized (e.g., before and after, pretest–posttest)	3
IV	Descriptive studies that include analysis of outcomes (single subject design, case series)	
V	Case reports and expert opinion, which include narrative literature reviews and consensus statements	
	Qualitative Studies	
		<b>TOTAL 26</b>

**Limitations of the Studies Appraised:**

Levels I, II, and III

Limitations of the studies selected for this review are as follows:

- Small sample sizes; limited generalization and statistical analyses
- Intervention period many have been too short to appropriately assess clinical change
- Lack of specificity regarding intervention approaches

- Methodological quality: randomization, lack of blinding, control groups, statistical analyses
- Lack of long-term follow-up data

Levels IV and V

N/A

### Articles Selected for Appraisal

Bingol, U., Altan, L., & Yurtkuran, M. (2005). Low-power laser treatment for shoulder pain. *Photomedicine and Laser Surgery*, 23, 459–464.

Callinan, N., McPherson, S., Cleaveland, S., Voss, D., Rainville, D., & Tokar, N. (2003). Effectiveness of hydroplasty and therapeutic exercise for treatment of frozen shoulder. *Journal of Hand Therapy*, 16, 219–224.

Diercks, R. L., & Stevens, M. (2004). Gentle thawing of the frozen shoulder: A prospective study of supervised neglect versus intensive physical therapy in seventy-seven patients with frozen shoulder syndrome followed up for two years. *Journal of Shoulder and Elbow Surgery*, 13, 499–502.

Ejnisman, B., Andreoli, C. V., Soares, B. G. O., Fallopa, F., Peccin, M. S., Abdalla, R. J., et al. (2004). Interventions for tears of the rotator cuff in adults. *Cochrane Database of Systematic Reviews*, Issue 1, Art. No.: CD002758. DOI: 10.1002/14651858. CD002758.pub2.

Gereats, J. J. X. R., Goossens, M. E. J. B., de Groot, I. J. M., de Bruijn, C. P. C., de Bie, R.B., Dinant, G.-J., et al. (2005). Effectiveness of a graded exercise therapy program for patients with chronic shoulder complaints. *Australian Journal of Physiotherapy*, 51, 87–94.

Gibson, K., Growse, A., Korda, L., Wray, E., & MacDermid, J. C. (2004). The effectiveness of rehabilitation for nonoperative management of shoulder instability: A systematic review. *Journal of Hand Therapy*, 17, 229–242.

Grant, H. J., Arthur, A., & Pichora, D. R. (2004). Evaluation of interventions for rotator cuff pathology: A systematic review. *Journal of Hand Therapy*, 17, 274–299.

Green, S., Buchbinder, R., & Hetrick, S. (2003). Physiotherapy interventions for shoulder pain. *Cochrane Database of Systematic Reviews*, Issue 2, CD004258. DOI: 10.1002/14651858. CD004258.

Guler-Uysal, F., & Kozanoglu, E. (2004). Comparison of the early response of two methods of rehabilitation in adhesive capsulitis. *Swiss Medical Weekly*, 134, 353–358.

Haldorsen, E., Grasdal, A., Skouen, J., Risa, A., Kronholm, K., & Ursin, H. (2002). Is there a right treatment for a particular patient group? Comparison of ordinary treatment, light multidisciplinary treatment, and extensive multidisciplinary treatment for long-term sick-listed employees with musculoskeletal pain. *Pain*, 95, 49–63.

Handoll, H. H. G. & Almaiya, M. A. (2004). Surgical versus non-surgical treatment for acute anterior shoulder dislocation. *Cochrane Database of Systematic Reviews*, Issue 1, Art. No.: CD004325. DOI: 10.1002/14651858. CD004325.pub2.

Handoll, H. H. G., Gibson, J. N. A., & Madhok, R. (2003). Interventions for treating proximal humerus fractures in adults. *Cochrane Database of Systematic Reviews*, Issue 4, Art. No.: CD000434. DOI: 10.1002/14651858. CD000434.

Handoll, H. H. G., Hanchard, N. C. A., Goodchild, L., & Feary, J. (2006). Conservative management following closed reduction of traumatic anterior dislocation of the shoulder. *Cochrane Database of Systematic Reviews*, Issue 1, Art. No.: CD004962. DOI: 10.1002/14651858. CD004962.pub2.

Jurgel, J., Rannama, L., Gapeyeva, H., Ereline, J., Kolts, I., & Paasuke, M. (2005). Shoulder function in patients with frozen shoulder before and after 4-week rehabilitation. *Medicina (Kaunas)*, *41*, 30–38.

Karjalainen, K., Malmivaara, A., van Tulder, M., Roine, R., Jauhiainen, M., Hurri, H., et al. (2005). Multidisciplinary biopsychosocial rehabilitation for neck and shoulder pain among working age adults. *Cochrane Database of Systematic Reviews*, Issue 3, Art. No.: CD002269. DOI: 10.1002/14651858. CD002269.

Ludewig, P. M., & Borstad, J. D. (2003). Effects of a home exercise programme on shoulder pain and functional status in construction workers. *Occupational and Environmental Medicine*, *60*, 841–849.

Lundblad, I., Elert, J., & Gerdle, B. (1999). Randomized controlled trial of physiotherapy and Feldenkrais interventions in female workers with neck-shoulder complaints. *Journal of Occupational Rehabilitation*, *9*, 179–194.

Michener, L. A., Walsworth, M. K., & Burnet, E. N. (2004). Effectiveness of rehabilitation for patients with subacromial impingement syndrome: A systematic review. *Journal of Hand Therapy*, *17*, 152–164.

Novak, C. B., Collins, E. D., & Mackinnon, S. E. (1995). Outcome following conservative management of thoracic outlet syndrome. *Journal of Hand Surgery*, *20A*(4), 542–548.

Piotte, F., Gravel, D., Moffet, H., Fliszar, E., Roy, A., Nadeau, S., et al. (2004). Effects of repeated distension arthrographies combined with a home exercise program among adults with idiopathic adhesive capsulitis of the shoulder. *American Journal of Physical Medicine and Rehabilitation*, *83*, 537–546.

Randlov, A., Ostergaard, M., Manniche, C., Kryger, P., Jordan, A., Heegard, S., et al. (1998). Intensive dynamic training for females with chronic neck/shoulder pain. A randomized controlled trial. *Clinical Rehabilitation*, *12*, 200–210.

Ryans, I., Montgomery, A., Galway, R., Kernohan, W. G., & McKane, R. (2005). A randomized controlled trial of intra-articular triamcinolone and/or physiotherapy in shoulder capsulitis. *Rheumatology*, *44*, 529–535.

Sjogren, T., Nissinen, K. J., Jarvenpaa, S. K., Ojanen, M. T., Vanharanta, H., & Malkia, E. A. (2005). Effects of a workplace physical exercise intervention on the intensity of headache and neck and shoulder symptoms and upper extremity muscular strength of office workers: A cluster randomized controlled cross-over trial. *Pain, 116*, 119–128.

Vermeulen, H. M., Rozing, P. M., Obermann, W. R., le Cessie, S., & Vliet Vleland, T. P. M. (2006). Comparison of high-grade and low-grade mobilization techniques in the management of adhesive capsulitis of the shoulder: Randomized controlled trial. *Physical Therapy, 86*, 355–368.

Waling, K., Sundelin, G., Ahlgren, C., & Jarvholm, B. (2000). Perceived pain before and after three exercise programs: A controlled clinical trial of women with work-related trapezius myalgia. *Pain, 85*, 201–207.

This work is based on the evidence-based literature review completed in October 2008 by Rebecca von der Heyde, MS, OTR/L, CHT.

CAT format adapted from a template provided by Dr. Annie McCluskey and freely available for use on the OT-CATS website (<http://otcats.com>)

For more information about the Evidence-Based Literature Review Project, contact the American Occupational Therapy Association, 301-652-6611, x 2052.



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