

Evidence Summary - Conservative Care Options for Work-Related Mechanical Shoulder Conditions

2010 Industrial Insurance Chiropractic Advisory Committee Occupational Health Practice Resource

Work-related shoulder conditions of mechanical origin for which patients seek conservative care typically present as shoulder pain with full or limited movement following an identifiable workplace exposure. Serious underlying conditions, associated with acute mechanically-triggered shoulder pain and restriction, are extremely rare. Flags for non-mechanical conditions include pain at rest, erythema, and unexplained swelling. Posttraumatic deformity and inability to perform **any** movements are flags for fracture or dislocation. Patient history, location of tenderness, and character of pain guide diagnosis. Examination is useful for discerning between articular, soft tissue, and referred pain sources. Imaging is not indicated initially in the absence of significant precipitating trauma, sudden onset of pain and swelling, palpable mass or deformity, or pain at rest. Acute onset, mild overuse/trauma, and lower shoulder disability scores predict a good outcome with conservative care. Increased age, female gender, severe or recurrent symptoms at presentation, concurrent neck pain, and higher disability scores are associated with poorer outcomes.

Shoulder Condition Case Definitions

- Clinical presentation of shoulder pain with full or limited movement following mechanical workplace activity/exposure.
- Work place exposures – falls, blunt force, or extended periods of overhead or awkward arm position.
- Diagnosis of a shoulder condition is usually based on clinical criteria with imaging reserved for patients presenting with specific red flags or non-response to 4-6 weeks of appropriate conservative care.

Evaluation Summary

- Rule-out potential red flag shoulder conditions that require a prompt specialty referral: such as shoulder pain associated with muscle weakness or inability to raise the arm/shoulder, deformity, swelling, fever/chills, suspected malignancy or shoulder instability or dislocation,
- Rule-in mechanical causes prior to initiating manual care. Suspected full thickness rotator cuff tears should be referred to specialist for urgent evaluation.
- Monitor health-related quality of life and shoulder function (e.g., shoulder questionnaires such as the Simple Shoulder Test (SST) or Shoulder Pain and Disability Index (SPADI) to establish a baseline to assess improvement over time.

Intervention Summary

- Limited evidence supports a combined manual approach of mobilization/manipulation, active/passive exercise, and soft tissue techniques for most mechanical shoulder conditions. Early improvement in pain and function is expected for recent acute injuries. Recovery may be delayed in chronic conditions.
- Consider reassessment and specialist consult if there is inadequate response to 4 weeks of conservative care.

Development

This document was developed by the Industrial Insurance Chiropractic Advisory Committee (IICAC) of the Washington State Department of Labor and Industries (L&I). It offers a summary of current evidence for practitioners. It is not a practice guideline, standard of care, claim management standard, or a substitute for clinical judgment in an individual case. This practice resource does not change L&I coverage or payment.

A comprehensive search of available scientific literature on commonly used shoulder evaluation & conservative procedures was conducted by the Policy, Practice, and Quality (PPQ) Subcommittee of the IICAC and department staff during Fall 2009. Literature was reviewed, assessed for relevance, and quality. Summaries were completed by the subcommittee in February 2010. The practice resource was posted online for public comment and revision, and approved for distribution by the IICAC in May 2010. This resource is expected to be updated periodically by the IICAC. Interested parties may submit new published scientific reports for consideration for future revisions.

Subcommittee

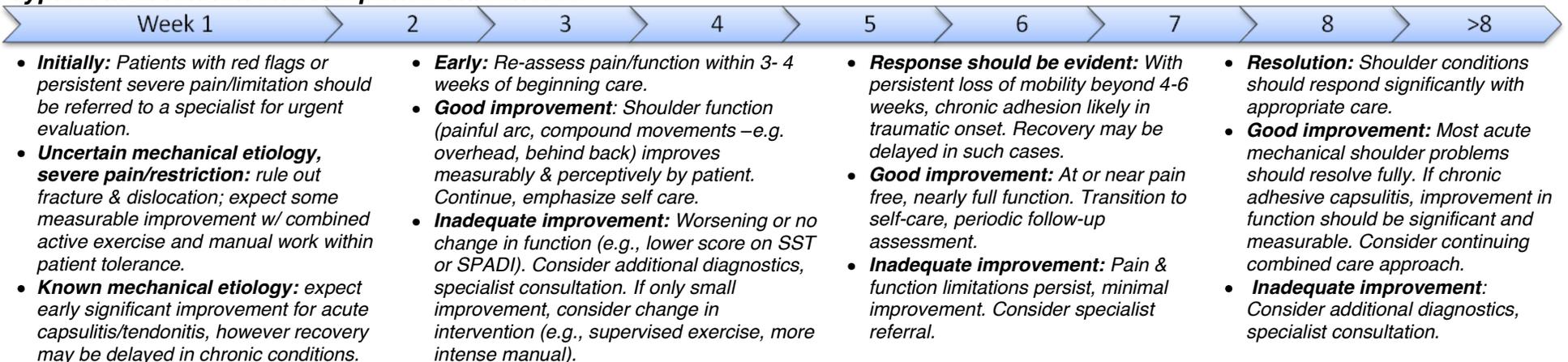
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Typical Intervention and Response Thresholds



	Baseline	1-2 wks	3-6 wks	7-8 wks	Beyond 8 wks
ASSESSMENT / PROGRESS	<p>Date: _____</p> <p><i>Work limitation:</i></p> <p><input type="checkbox"/> Off work</p> <p><input type="checkbox"/> Weight restriction: _____</p> <p><input type="checkbox"/> Activity limits: _____</p> <p><input type="checkbox"/> Awkward work tolerance: _____ hrs</p> <p><i>Function Score</i> (e.g., SST or SPADI) Baseline: _____</p> <p><i>Pain Interference w/ activity:</i></p> <p>None _____ Total _____</p> <p>0 1 2 3 4 5 6 7 8 9 10</p> <p><i>Baseline</i> (check all that apply):</p> <p><input type="checkbox"/> Arm weakness</p> <p><input type="checkbox"/> Stiffness</p> <p><input type="checkbox"/> Shoulder pain</p> <p><input type="checkbox"/> Pain interferes with sleep</p>	<p>Date: _____</p> <p><i>Work limitation improvement:</i></p> <p><input type="checkbox"/> Off work</p> <p><input type="checkbox"/> Weight restriction: _____</p> <p><input type="checkbox"/> Activity limits: _____</p> <p><input type="checkbox"/> Awkward work tolerance: _____ hrs</p> <p><i>Function Score</i> (e.g., SST or SPADI) Baseline: _____</p> <p><i>Pain Interference w/ activity:</i></p> <p>None _____ Total _____</p> <p>0 1 2 3 4 5 6 7 8 9 10</p> <p><i>Percent Improvement</i> (pt. perception):</p> <p>___ Arm weakness</p> <p>___ Stiffness</p> <p>___ Shoulder pain</p> <p>___ Pain interferes with sleep</p>	<p>Date: _____</p> <p><i>Work limitation improvement:</i></p> <p><input type="checkbox"/> Off work</p> <p><input type="checkbox"/> Weight restriction: _____</p> <p><input type="checkbox"/> Activity limits: _____</p> <p><input type="checkbox"/> Awkward work tolerance: _____ hrs</p> <p><i>Function Score</i> (e.g., SST or SPADI) Baseline: _____</p> <p><i>Pain Interference w/ activity:</i></p> <p>None _____ Total _____</p> <p>0 1 2 3 4 5 6 7 8 9 10</p> <p><i>Percent Improvement</i> (pt. perception):</p> <p>___ Arm weakness</p> <p>___ Stiffness</p> <p>___ Shoulder pain</p> <p>___ Pain interferes with sleep</p>	<p>Date: _____</p> <p><i>Work limitation improvement:</i></p> <p><input type="checkbox"/> Off work</p> <p><input type="checkbox"/> Weight restriction: _____</p> <p><input type="checkbox"/> Activity limits: _____</p> <p><input type="checkbox"/> Awkward work tolerance: _____ hrs</p> <p><i>Function Score</i> (e.g., SST or SPADI) Baseline: _____</p> <p><i>Pain Interference w/ activity:</i></p> <p>None _____ Total _____</p> <p>0 1 2 3 4 5 6 7 8 9 10</p> <p><i>Percent Improvement</i> (pt. perception):</p> <p>___ Arm weakness</p> <p>___ Stiffness</p> <p>___ Shoulder pain</p> <p>___ Pain interferes with sleep</p>	
	INTERVENTION OPTIONS	<p>Manual</p> <ul style="list-style-type: none"> Combined mobilization, active and passive exercise, and soft tissue work typically reduce pain and improve function for mechanical shoulder problems. Treatment frequency reported in trials was usually 2-3 times per week. <p>Modalities/Medications</p> <ul style="list-style-type: none"> Modalities or NSAIDs do not appear to add benefit to manual interventions. Non-NSAID analgesics might provide pain relief. Subacromial steroid injection may be helpful for rotator cuff tears and tendinoses that do not respond with manual methods. 	<p>Manual</p> <ul style="list-style-type: none"> Incrementally increasing intensity of manual techniques within patient tolerance is recommended. Consider modification of methods in absence of meaningful functional improvement. Patients should receive home exercise and range of motion instructions. Supervised exercise may be beneficial with rotator cuff conditions and adhesive capsulitis. Trials generally reported twice weekly frequency for 6-8 weeks. Surgical intervention for rotator cuff tears may be of greatest benefit for younger individuals whose response to 4-6 weeks of manual methods is inadequate. <p>Response:</p> <ul style="list-style-type: none"> 10-20% improvement at 2 wks is typical without care. Therapeutic target should be 30% improvement. 	<p>Good Improvement</p> <ul style="list-style-type: none"> Natural progression of uncomplicated shoulder problems is typically ~50% improvement in pain and function in 4-6 weeks and fully resolved in 8-12 weeks. When mechanical etiology is identifiable, reduction in pain, and increased ranges of combined movements (e.g., reaching behind head and back) can be expected with 4-6 weeks of treatment. Acute shoulder-only conditions respond very quickly to conservative intervention. Chronic shoulder conditions and conditions with neck and shoulder involvement typically respond slower (e.g., adhesive condition may last several months). <p>Inadequate improvement</p> <ul style="list-style-type: none"> Reassessment for red flags, further diagnostics, and specialist consultation is warranted in non-responding cases. Specialist consults and supervised exercise should be considered when continuing response to manual interventions is stalled/unexplained after 6 weeks. Difficult shoulder conditions include refractory frozen shoulder, chronic conditions such as adhesive capsulitis, and more severe rotator cuff tears. Recovery may take several months. Posterior glenohumeral dislocations are difficult to diagnose and may account for failure to respond in suspected cases of frozen shoulder or early adhesive capsulitis. Trauma from the anterior associated with condition onset may be a diagnostic clue. 	

Simple Shoulder Test (SST)

(Voluntary educational / practice aid. This is not an L&I documentation requirement)

Simply circle Yes or No

- 1. Is your shoulder comfortable with your arm at rest by your side? Yes No
- 2. Does your shoulder allow you to sleep comfortably? Yes No
- 3. Can you reach the small of your back to tuck in your shirt with your hand? Yes No
- 4. Can you place your hand behind your head with the elbow straight out to the side? Yes No
- 5. Can you place a coin on a shelf at the level of your shoulder without bending your elbow? Yes No
- 6. Can you lift 1 lb (a full pint container) to the level of your shoulder without bending your elbow? Yes No
- 7. Can you lift 8 lb (a full gallon container) to the level of the top of your head without bending your elbow? Yes No
- 8. Can you carry 20 lb (a bag of potatoes) at your side with the affected arm? Yes No
- 9. Do you think you can toss a softball underhand 10 yards with the affected arm? Yes No
- 10. Do you think you can throw a softball overhand 20 yards with the affected arm? Yes No
- 11. Can you wash the back of your opposite shoulder with the affected arm? Yes No
- 12. Would your shoulder allow you to work full-time at your regular job? Yes No

Patient Name _____

Claim # _____

Date: _____

**FOR OFFICE USE
COMMENTS:**

Score (Total # of "No"s)

Godfrey J, Hammoan R, Lowenstein S, Briggs K, Kocher M. Reliability, validity, and responsiveness of the simple shoulder test: psychometric properties by age and injury type. J Shoulder Elbow Surg 2007; 16:260-267.

How severe is your pain?

- 1. At its worst: *(No pain)* 0 1 2 3 4 5 6 7 8 9 10 *(Worst Pain Imaginable)*
- 2. When lying on involved side: *(No pain)* 0 1 2 3 4 5 6 7 8 9 10 *(Worst Pain Imaginable)*
- 3. Reaching for something on a high shelf: *(No pain)* 0 1 2 3 4 5 6 7 8 9 10 *(Worst Pain Imaginable)*
- 4. Touching the back of your neck: *(No pain)* 0 1 2 3 4 5 6 7 8 9 10 *(Worst Pain Imaginable)*
- 5. Pushing with the involved arm: *(No pain)* 0 1 2 3 4 5 6 7 8 9 10 *(Worst Pain Imaginable)*

How much difficulty do you have?

- 1. Washing your hair: *(No difficulty)* 0 1 2 3 4 5 6 7 8 9 10 *(So difficult - help is required)*
- 2. Washing your back: *(No difficulty)* 0 1 2 3 4 5 6 7 8 9 10 *(So difficult - help is required)*
- 3. Putting on an undershirt or pullover sweater: *(No difficulty)* 0 1 2 3 4 5 6 7 8 9 10 *(So difficult - help is required)*
- 4. Putting on a shirt that buttons down the front: *(No difficulty)* 0 1 2 3 4 5 6 7 8 9 10 *(So difficult - help is required)*
- 5. Putting on your pants: *(No difficulty)* 0 1 2 3 4 5 6 7 8 9 10 *(So difficult - help is required)*
- 6. Placing an object on a high shelf: *(No difficulty)* 0 1 2 3 4 5 6 7 8 9 10 *(So difficult - help is required)*
- 7. Carrying a heavy object of 10 pounds: *(No difficulty)* 0 1 2 3 4 5 6 7 8 9 10 *(So difficult - help is required)*
- 8. Removing something from your back pocket: *(No difficulty)* 0 1 2 3 4 5 6 7 8 9 10 *(So difficult - help is required)*

Patient Name _____

Claim # _____

Date: _____

FOR OFFICE USE:

Scoring

Pain score:

_____ / 50 x 100 = _____ %
Sum of #'s circled in pain section

Disability Score:

_____ / 80 x 100 = _____ %
Sum of #'s circled in disability section

Total Score:

_____ / 130 x 100 = _____ %
Sum of #'s circled in both section s

SHOULDER CONDITION GLOSSARY

Adhesive Capsulitis (Frozen Shoulder): Restricted and painful condition of the capsular ligaments of the shoulder resulting from scarring related to inflammatory processes. This is not a degenerative process nor is it necessarily the result of trauma; often insidious in onset.

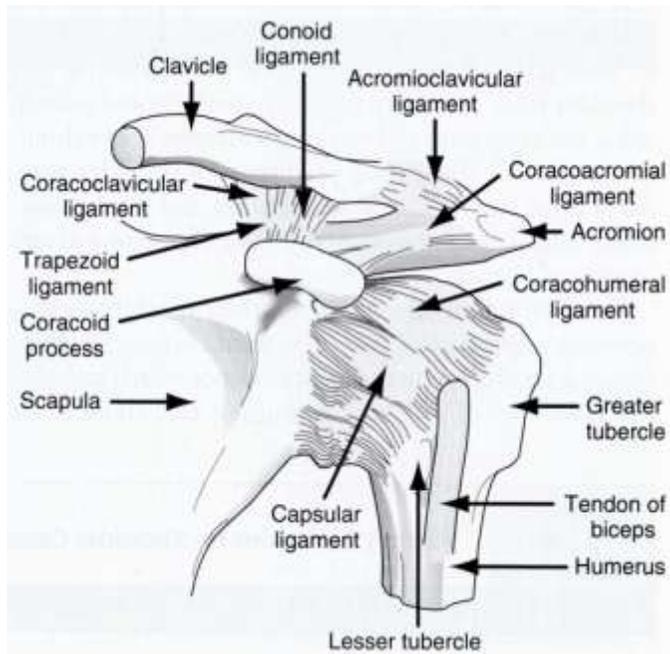
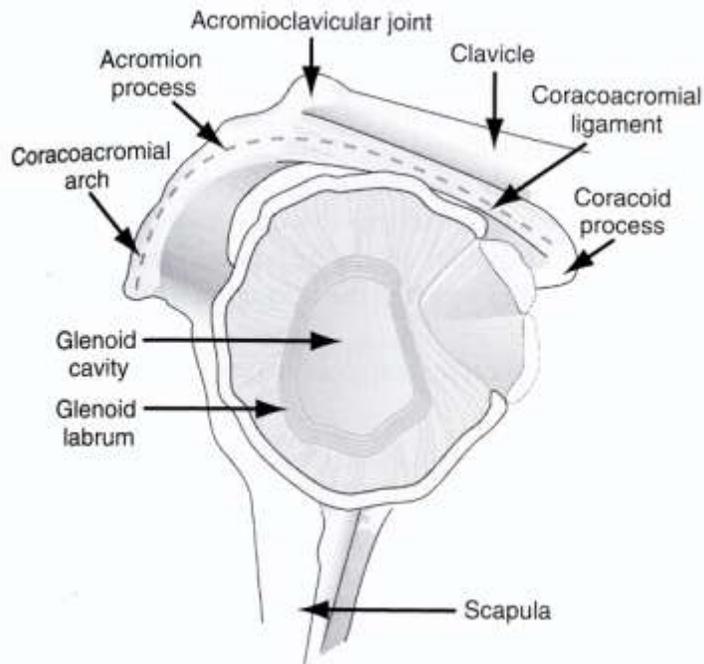
Chronic Tendonitis, Bursitis, Degenerative Joint Disease (DJD): Prolonged inflammatory process of muscle tendons/ bursa which become painful and restricted. Chronically inflamed structures may become enlarged and/or infiltrated with scar tissue and calcium, e.g., calcific bursitis/tendonitis. Inflammation results from many causes including local trauma and overuse. Such condition sometimes become chronic.

Dislocation: Dislocation typically results from excessive trauma to the shoulder leading to substantial rupture of the stabilizing ligaments and tendons. The most common and recognizable is an anterior dislocation which presents with an obvious history, swelling and deformity. Posterior dislocations are less common, more difficult to diagnose and may mimic other shoulder conditions.

Impingement Syndrome: Shoulder pain resulting from irritation of rotator cuff tendons and/or the subacromial bursa usually due to mechanical friction of these structures against bony structures.

Labrum Tear: Typically an avulsion of the glenoid cartilage which rings the scapular surface of the shoulder joint. The structure provides some stability by providing some depth to the "socket" side of the joint. Tears have been implicated as internal derangements that may cause restriction, clicking, and sometimes painful limitation of arm movement. Inferior tears are common with dislocation. Tears may also occur with sudden or excessive biceps contraction on the upper part of the labrum where the biceps tendon inserts. They are commonly categorized by location and severity as superior labral anterior to posterior (SLAP) lesions with Type I being least severe and Type IV being most severe.

Rotator cuff tendonitis/tear: The rotator cuff consists of the supraspinatus, infraspinatus, subscapularis, and teres minor muscles which originate on the scapula and whose tendons insert on the humerus. When damaged by sudden trauma, overuse, or overexertion, fibers of the tendon become sprained and inflamed. Partial supraspinatus tears are the most common and may occur on the bursal side or the articular side of the tendon.



OCCUPATIONAL SHOULDER CONDITION CLINICAL ASSESSMENT SUMMARY

<p>Occupational Shoulder Conditions</p>	<p>Clinical presentation</p> <ul style="list-style-type: none"> • Typically, shoulder pain is reproducible during particular movements. • Movement may be restricted (pain precludes movement) or full (movement can be performed but causes pain). • Onset follows mechanical workplace exposure. <p>Work place exposure</p> <ul style="list-style-type: none"> • Overhead work for extended periods, prolonged repetitive use of arms in awkward position. • Direct trauma (e.g. blunt force blow to shoulder, fall onto shoulder). • Indirect trauma (e.g. fall onto outstretched arm/elbow that leverages sudden impact to shoulder). <p>Corroboration of diagnosis is usually clinical</p> <ul style="list-style-type: none"> • History (exposure, painful restricted movement). • Shoulder function questionnaire documents disability (e.g. SST, SPADI). • Imaging may be helpful early in substantial trauma or to evaluate non-mechanical etiology such as tumor or infection. • Imaging for mechanical shoulder problems is not routinely indicated unless there are red flags for underlying pathology or response is inadequate to appropriate conservative intervention. 	<p>Souza 2009 Bussieres 2009</p>
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HISTORY – DIAGNOSTIC INDICATORS FOR OCCUPATIONAL SHOULDER CONDITIONS

<p>Patient Presentation <i>(for DDx and work-relatedness)</i></p>	<p>Nature:</p> <ul style="list-style-type: none"> • Pain upon shoulder movement or local tissue provocation. • Stiffness with or without pain is common with adhesive capsulitis, dislocation, and other arthritides. • Instability or hypermobility may suggest ligamentous damage • Weakness (distinct from movement avoidance due to pain) may be associated with muscle tears and neural injury. • Numbness/tingling may be a sequel of neural trauma or vascular involvement. <p>Onset:</p> <ul style="list-style-type: none"> • Positional (e.g. pain and restriction followed extended overhead/awkward work). • Trauma (e.g. a fall on or direct blow to the shoulder at work). • Repetitive arm activity, particularly in prolonged/awkward positions. • Insidious onset, unexplained erythema, swelling, elevated tissue temperature, or pain at rest are flags for non-mechanical causes and warrant consideration for specialist referral. <p>Age:</p> <ul style="list-style-type: none"> • Instability more common in younger workers (<35 years). • Rotator cuff tears and tendonitis more common in older workers (>35 years). <p>Pain location and tenderness:</p> <ul style="list-style-type: none"> • Identification of specific anatomical pain generators has not withstood scientific scrutiny. For some shoulder conditions such as deltoid or sub acromial bursitis, tenderness may be useful for targeting inflamed structures. <p>Mobility</p> <ul style="list-style-type: none"> • Restriction of most any movement following trauma is a red flag for fracture or dislocation. Restriction of most movement due to pain following little or no trauma suggests bursitis or adhesive capsulitis. 	<p>Souza 2009 NZGG 2004</p>
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<p>Nature of Trauma (for DDX)</p>	<p>Sudden arm traction – consider:</p> <ul style="list-style-type: none"> • Subluxation, brachial plexus injury <p>Fall on outstretched straight arm (land on hand) – consider:</p> <ul style="list-style-type: none"> • AC separation or clavicle fracture • Posterior dislocation • Labrum tear • Rotator cuff tear <p>Blow/fall on > 90° flexed shoulder with external rotation (fall and tumble on face with arms overhead and elbow flexed) – consider:</p> <ul style="list-style-type: none"> • Anterior dislocation • Labrum tear <p>Anterior blow to shoulder – consider:</p> <ul style="list-style-type: none"> • Dislocation, subluxation • Contusion <p>Superior blow/fall on shoulder – consider:</p> <ul style="list-style-type: none"> • AC separation, distal clavicle fracture • Contusion (pointer) <p>Sudden pain on heavy loading (without dislocation, e.g. weight-lifting) – consider:</p> <ul style="list-style-type: none"> • Muscle/tendon rupture • Labrum tear 	<p>Souza 2009</p>
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HISTORY – PROGNOSTIC INDICATORS

<p>Risk Factors for Prolonged Disability (for progress)</p>	<ul style="list-style-type: none"> • Baseline indicators – longer duration of symptoms, higher severity, gradual onset (each independently predicts longer term disability and poorer recovery). • Older age and a chronic history of shoulder pain and restriction predict poorer outcomes. • Female gender is associated with higher disability with general shoulder pain. • A SPADI disability score above 10, symptom duration longer than one month, receiving an injection at consultation, and having a past history of shoulder pain are significantly associated with poorer 6 month outcomes. • Patients with severely restricted passive elevation at baseline (less than 101 degrees) have poorer 6 months outcomes. • Patients with a history of slight trauma or overuse have favorable outcomes, especially patients with rotator cuff tendinitis. • In patients with shoulder pain associated with capsulitis and/or other glenohumeral etiologies, concomitant neck pain at presentation and initial treatment is associated with poorer outcome. • Higher age, overload at work, and working with a hand above shoulder level are associated with increased the risk of persistent severe shoulder pain. History of exercise is associated with decreased risk. • The overall natural progression of general shoulder pain for which care is sought by 166 patients in one British primary care setting was complete recovery in 21% of patients by 6 months and 49% of patients by 18 months. Longer recovery times correlated with longer symptom durations and more prior episodes. 	<p>Thomas 2005 Largacha 2006 Croft 1996 Van der Windt 1996 Miranda 2001 Croft 1996</p>
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CLINICAL EXAMINATION – FUNCTIONAL DEFICIT

<p>Range of Motion <i>(for diagnosis)</i></p>	<ul style="list-style-type: none"> Flexion, abduction, and external rotation assessed by visual, goniometric and photographic methods have fair to good reliability, but measurement errors are large. Internal rotation measured by reaching behind back is unreliable due to elbow movement. Intrarater reliability of 4 physiologic shoulder movements was high. The standard error (SE) for angular inclinometer measurements of 2 physiological shoulder movements (flexion, abduction in a standing position, inclinometer positioned at deltoid insertion) is about 5°. Internal rotation measured visually using a visual midline between the humeral epicondyles starting from a maximal external rotation position (thumb out) to a maximal internal rotation position had a standard error of 13°. External rotation measured linearly (from a standing position using a tape measure between umbilicus and ulnar styloid) had a standard error of 1.6 cm. Gravity inclinometer measurements show high intra- and inter-rater reliability for hand behind back & flexion. Intra- and inter-rater reliability is poor for abduction, external or internal rotation in abduction. 	<p>Hayes 2001 Hayes 2003 Wakabayashi 2006 Valentine 2006</p> <p>Ginn 2006 Hoving 2002</p>
<p>Functional Disability Questionnaires <i>(for progress)</i></p>	<p>There are a large number of shoulder function questionnaires available for assessing shoulder function and disability. A systematic review of 16 questionnaires for which substantial evidence was available concluded the Disability of the Arm, Shoulder, and Hand Scale (DASH), the Shoulder Pain and Disability Index (SPADI), and the American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES) were all satisfactory but each had limitations (particularly sample size) and none were adequate for all properties scored (validity, reproducibility, responsiveness, inter probability, and practical burden). The Simple Shoulder Test (SST) or the Shoulder Pain and Disability Index (SPADI) are both simple validated instruments that are available for use without licensing requirements (examples are included at the beginning of this document).</p> <ul style="list-style-type: none"> Simple Shoulder Test (SST) is a 12 question shoulder activity scale developed at the University of Washington that has high patient utility, is highly reliable across age groups and is sensitive to change. This instrument captures the patient's perception of how well they function. Its primary utility is to measure improvement over time with care. It also has the advantage of being free of licensing fees. Shoulder Pain and Disability Index (SPADI) is a valid measure to assess pain and disability in community-based patients reporting shoulder pain due to musculoskeletal pathology. It is not useful for initial differential diagnosis but appears sensitive to change especially for range of motion with adhesive capsulitis. Therefore, like the SST, its primary utility is to measure improvement over time with care. This instrument is not validated for diagnostic purposes nor comparing severity between different individuals, rather how a patient's pain and function changes over time. SPADI has the ability to distinguish changed in pain and function separately. Results for test-retest reproducibility indicated a small detectable difference of 17 points on the 1-100 scale, and on intra-class correlation coefficient of 0.89. The SPADI was generally more responsive than standard ROM testing. When compared to three other diagnostic questionnaires (SDQ-NL: Dutch Shoulder Disability Questionnaire, SDQ-UK: United Kingdom Shoulder Disability Questionnaire, SRQ: Shoulder Rating Questionnaire), the SPADI was found to be valid with similar patient acceptability, but most responsive to change and the quickest to complete. When compared to the Croft Index and the DASH in adhesive capsulitis patients, the SPADI was found to be valid and responsive with a slight advantage over other questionnaires. The VAS scale was found to be the best performing generic measure in terms of responsiveness in the patient group. Disability of Arm, Shoulder, Hand (DASH) Scale has the best clinometric properties and has a work component. It's been used increasingly as an outcome measure for upper limb pathology. It assesses entire upper arm function including elbow and hand. Reliability and reproducibility have been demonstrated in several studies. QuickDASH is easier to use but underestimates symptoms and overestimates disabilities. It does not measure the same content as the DASH. QuickDASH is less specific than the DASH in the subdomains, especially in symptoms. 	<p>Bot 2004</p> <p>Maston 2005 Godfrey 2007</p> <p>Tveita 2008 MacDermid 2006 Paul 2004 Staples 2009</p> <p>De Smet 2008</p> <p>Angst 2009</p> <p>Kocher 2006</p>

	<p>The QuickDASH can be recommended for a summary assessment of arm symptoms and function based on the score to save time. The full DASH, however, provides more specific and sophisticated results.</p> <ul style="list-style-type: none"> • American Shoulder & Elbow Surgeons (ASES) Assessment Form – is a subjective shoulder pain scale that has acceptable correlation with SF-36 physical functioning, role physical, and bodily pain domains. 	
<p>Pain Interference (for progress)</p>	<p>Specific attention to how a patients' pain interferes with their ability to perform usual activities has been shown to be useful in predicting chronicity for low back and other musculoskeletal problems, particularly in injured worker populations. A fast and simple approach to track the impact of the patient's pain on their function could be a simple anchored 0-10 scale such as:</p> <p><i>In the last month, how much has your shoulder pain/problem interfered with your daily activities? (Use a scale from 0 to 10, where 0 is "no interference" and 10 is "unable to carry on any activities")</i></p>	<p>Fulton-Kehoe 2008 Turner 1998 Von Korff (in press)</p>
<p>Strength – Weakness (for DDx)</p>	<p>Rotator cuff tendonitis:</p> <ul style="list-style-type: none"> • In general, tests for rotator cuff muscle weakness appear to correlate well in patients with cuff tears. Tests, based on presence or location of subscapular pain, do not appear to correlate well. • Presence or location of subscapular pain do not correlate with either the presence or site of rotator cuff tears based on a chart review of 140 rotator cuff tear patients. • Detectable subscapularis weakness (usually indicating a partial or full-tear) by performing the Lift-Off test (patient places hand behind back and lifts it posteriorly) correlates well with rotator cuff tears. • The internal rotation Lag Sign is more sensitive but less specific than the Lift-Off test. It is more sensitive for partial subscapularis ruptures compared to the Lift-Off test. • Full/Empty Can (aka supraspinatus strength) test (arms flexed 90°, abducted 30°, resists downward pressure in thumbs-up, then in thumbs-down position) - has slightly higher correlation with arthroscopy findings of rotator cuff tears than pain tests. • The external rotation Lag sign is less sensitive than the Empty Can test but more specific. • Infrapinatus strength/weakness tests (elbow at side, flexed 90° forearm externally rotated against resistance), has more correlation with arthroscopy findings than pain tests. 	<p>Itoi 2006 Hertel 1996 Ostor 2004</p>
DIAGNOSTIC CATEGORIZATION		
<p>Diagnostic Classification of Occupational Shoulder Conditions</p>	<p>Shoulder conditions can be categorized pathologically along the lines of (see glossary on page 5):</p> <ul style="list-style-type: none"> • General shoulder pain/restriction • Rotator cuff tendonitis • Impingement syndromes <ul style="list-style-type: none"> ○ Subacromial impingement syndrome – often related to rotator cuff tendonopathies ○ Capsular impingement syndromes – frequently involving posterior capsule • Chronic tendonitis, bursitis, DJD • Adhesive capsulitis • Labrum tear • Dislocation • Instability <p>A study on agreement of diagnostic classification reported moderate intra and inter rater agreement between two trained therapists for grouping 201 shoulder pain and restriction patients into six categories based on diagnostic criteria recommended by the Dutch College of General Practitioners. Diagnostic grouping was especially difficult for patients with high pain severity, chronic, and bilateral conditions.</p> <ul style="list-style-type: none"> • Capsular Syndrome (e.g., capsulitis, arthritis) 	<p>Souza 2009</p> <p>de Winter 1999 Bakker 1990</p>

	<ul style="list-style-type: none"> • Acute bursitis • Acromioclavicular syndrome (e.g., joint and superior muscle lesions including spine and scapula) • Subacromial syndrome (e.g., tendonitis, chronic bursitis) • Rest Group (e.g., non mechanical, unexplained) • Mixed clinical picture (multiple contributing structures) <p>Diagnostic conclusions of occupational shoulder conditions require elements of workplace exposure related to condition onset, presentation, and clinical findings. Despite the extensive availability of clinical examination methods and “conventional wisdom” regarding differential diagnosis of shoulder problems, reliability and validity of various clinical assessments for shoulder conditions have been shown to be of limited value. Further, studies for a large variety of shoulder conditions suggest that a similar mix or conservative interventions (e.g., passive and active movement) provide benefit, thus the importance of precise differential diagnosis of mechanical contributors early may be of limited value.</p>	<p>Hayes 2003 Souza 2009</p>
CLINICAL EXAMINATION – PROVOCATION/RELIEF		
<p>Point provocation <i>(for DDx)</i></p>	<p>General shoulder pain/restriction:</p> <ul style="list-style-type: none"> • Assessment of tenderness has good inter and inter-rater reliability. <p>Rotator cuff tendonitis:</p> <ul style="list-style-type: none"> • Eliciting tenderness at the insertion sites of some tendons is based on specific shoulder positioning. Palpation of the tendon insertion is not possible; creation of tenderness is the objective. • Supraspinatus tendon insertion is reliably palpable below the AC joint with extension and internal rotation (flexed elbow behind back, reaching up to scapula and lifted posteriorly). • Infraspinatus and teres minor tendons are palpable below the posterior acromion with 90° flexion, 10° adduction, and 20° external rotation (flexed elbow in front of nose, hand/forearm rotated laterally). <p>Dislocation:</p> <ul style="list-style-type: none"> • Acromio-clavicular (AC) region tenderness with deformity secondary to trauma suggests AC separation or distal clavicle fracture. • Discrete AC tenderness without deformity suggests minor AC separation or local contusion. May indicate distal clavicle osteolysis in individuals with continued extreme loading (e.g. weightlifter). 	<p>Souza 2009 Mattingly 1996 Scavenius 1992 Ostor 2004</p>
<p>Contractile provocation <i>(for DDx)</i></p>	<p>Resisted contraction assessments of shoulder movements are often used for the purpose of localizing where pain occurs when specific contractile tissues are recruited. Studies of these tests have generally not correlated with surgical or imaging studies and are considered unreliable for localization or diagnosis.</p>	<p>Hayes 2003</p>
<p>Positional provocation <i>(for DDx)</i></p>	<p>General shoulder pain/restriction:</p> <ul style="list-style-type: none"> • Painful Arc test (painful active midrange abduction at 70°-100° with decreased pain above 100°) has good intra/inter rater reliability. When a pain occurs in this range on active movement, but not on passive movement, contractile tissue is likely involved. When a painful arc is found on both active & passive movement, any number of soft tissues may be involved (contractile, bursa, etc) and is not helpful. • Overall, the inter-examiner reliability of Cyriax classification of types of lesions has been demonstrated to be poor and unacceptable. However, experienced examiners may be able to differentiate between normal palpatory joint end feel and pathological palpatory joint end feel of passive shoulder end range. Examiners’ findings of pathological end feel moderately correlates with patient report of pain. However, classic anatomic categorizations of end feel (e.g. Cyriax “capsular,” “tendinous,” etc end feel) may not reflect restrictions coming from the named structures. 	<p>Souza 2009 Ostor 2004</p> <p>Hayes 2003 Peterson 2000</p>

	<p>Rotator cuff tendonitis:</p> <ul style="list-style-type: none"> Drop Arm Test - Inability to control lowering outstretched arm from abducted position suggests rotator cuff involvement. <p>Adhesive capsulitis:</p> <ul style="list-style-type: none"> Multidirectional active AND passive restriction suggests adhesive capsulitis. Inability to perform most movements suggests early inflammation (e.g. bursitis, beginning adhesive capsulitis). Shoulder hunching during movement suggests compensation for restricted movement (e.g. with adhesive capsulitis, DJD). <p>Labrum tear:</p> <ul style="list-style-type: none"> Sharp, reproducible pain at a discrete point on active moment (that can be avoided with alternative movement) suggests internal gleno-humeral derangement such as labrum tear. <p>Dislocation:</p> <ul style="list-style-type: none"> Post traumatic avoidance of most-all movement generally suggests fracture or dislocation. Inability to flex shoulder in a supinated position suggests posterior dislocation. 	<p>Park 2005</p> <p>Souza 2009</p>
<p>Other provocation and orthopedic tests (for DDx)</p>	<p>Rotator cuff tendonitis:</p> <ul style="list-style-type: none"> Combining Painful Arc, Drop Arm, and infraspinatus strength tests appear to have a higher positive predictive value for correlating with surgical finding of rotator cuff tear than individual tests. Diagnosis of a full-thickness rotator cuff tear cannot be conclusively reached using one or more of the lag signs. <p>Impingement syndrome:</p> <ul style="list-style-type: none"> Subacromial impingement can be evaluated by combining Hawkins-Kennedy, Painful Arc & infraspinatus strength tests. They appear to have higher positive predictive value for finding impingement syndromes in surgery than individual tests. Posterior-superior impingement is evaluated using the apprehension sign followed by the relocation sign. Pain felt with the apprehension sign relieved by the relocation sign is an indication of posterior-superior impingement of the posterior capsule and labrum. <p>Labrum tear:</p> <ul style="list-style-type: none"> Individual clinical provocation tests do not have good general predictability for findings of labrum tear on advanced imaging or during surgery. However, when combined tests are positive (specifically crank, apprehension, and load & shift tests), and there is a consistent presentation & history (e.g., clicking & locking), the tests help to rule in the condition. When negative, the tests do not rule out a labrum tear. One small study with well trained specialists reported reasonable correlation for Biceps Load, Mimori Pain Provocation and internal rotation resistance strength with arthroscopic findings, however, arthroscopy remains the diagnostic standard. The Active Compression (O'Briens test), and the following tests Yergason, Jobe, Relocation, Anterior Slide, Hawkins, Speed, Neer have good negative predictability to help rule out labrum tears even though they are not each specifically designed for labrum testing. Sub-categories of testing such as SLAP (superior labrum, anterior to posterior) lesions are more often tested with these maneuvers. <p>Instability:</p> <ul style="list-style-type: none"> Relocation Test & Anterior Release tests are reported to have good predictability for obvious instability but are of 	<p>Park 2005</p> <p>Miller 2008</p> <p>Park 2005</p> <p>MacFarland 2002</p> <p>Parentis 2006</p> <p>Liu 1996</p> <p>Calvert 2009</p> <p>O'Brien 1998</p> <p>Parentis 2006</p>

	<p>questionable value for subtle lesions. Other orthopedic tests (including Apprehension, Clunk, Release, Load & Shift tests, and the Sulcus sign) are not useful for determining glenohumeral instability.</p> <ul style="list-style-type: none"> Point tenderness correlates with surgical findings of acromioclavicular lesions. Cross body adduction stress test and AC resisted extension test have high sensitivity, specificity and negative predictive value for correlating with surgical findings of AC lesions. 	<p>Chronopoulos 2004</p>
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SPECIALIZED EXAMINATION

<p>Imaging (for DDx)</p>	<p><u>In general:</u></p> <p>Imaging for shoulder conditions is useful in some circumstances. However, for most pain and restriction conditions associated with a workplace exposure, imaging should only be considered if the condition does not respond to 4 weeks of conservative treatment. Circumstances where imaging should be considered include:</p> <ul style="list-style-type: none"> Acute, severe trauma (blunt force, suspicion of fracture, abnormal shape/suspicion of dislocation). Non-mechanical pain (unrelenting pain at rest, constant or progressive symptoms and signs, pain not reproduced on assessment-particularly if patient has history of cancer, enlarging mass, unexplained deformity, pain at multiple sites, age > 50, pain at rest, unexplained weight loss). Suspicion of infection (red skin, fever, systemically unwell, history of immunosuppression, penetrating wound). Substantial activity and/or work restriction lasting beyond 4 weeks. Failure to respond to conservative care by 4 weeks (e.g., no change, worsening, increasing disability). <p>Plain film radiography is useful for assessing:</p> <ul style="list-style-type: none"> Impingement – using Outlet view and Zanca (15 degree cephalad view) for subacromial impingement. Anterior dislocation – using AP internal rotation or anterior oblique (Y view), axillary projection for viewing glenoid Posterior dislocation – using the Y view or transthoracic view. AC joint separation – Zanca view is best; bilateral views (weighted and non-weighted) have not been shown to alter management. Instability <ul style="list-style-type: none"> Osteolysis or fractures of the distal clavicle – using a Zanca view Sternoclavicular joint – using Hobb’s and serendipity views Humeral head fractures – seen primarily on true AP internal and external rotation <p>Advanced imaging includes magnetic resonance imaging (MRI), computed tomography (CT), and ultrasonography (US). These should typically be reserved for cases where conservative care has failed to resolve the problem.</p> <ul style="list-style-type: none"> MRI may be useful when patients are unresponsive to conservative care. <ul style="list-style-type: none"> Standard MRI Contrast MRI CT <ul style="list-style-type: none"> CT arthrograms are used mainly for glenoid labrum and rotator cuff tears. Plain film arthrograms US (diagnostic ultrasound) is valuable for detecting full thickness cuff tears. Partial tears are sometimes detectable. <p><u>Evidence for imaging options:</u></p> <p><u>General shoulder pain/restriction:</u></p> <ul style="list-style-type: none"> MRI findings correlate with clinical findings better than ultrasound findings do. <p><u>Shoulder pain/restriction attributed to “subacromial girdle” (acromioclavicular and glenohumeral joint) lesion (pain &</u></p>	<p>Bussieres 2009</p>
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restriction with specific localized findings)

- **A-C joint disorders:** Radiographs not initially indicated in non-traumatic origin. Plain film radiographs may be indicated to assess AC joint separation. AC dislocations (Types IV, V and VI) should be referred for orthopedic evaluation. MRI is more sensitive to A-C joint degeneration than plain film studies. Reactive bone edema on MRI is more reliable predictor of symptomatic A-C joint than degenerative changes seen on MRI. MRI allows assessment of adjacent soft tissues.
- **Adult patients with significant shoulder/glenohumeral joint trauma:** Radiographs recommended to rule out fracture or dislocation. However, patients are unlikely to require initial radiographic examination if there is a fall and pain at rest but no swelling, palpable mass or deformity and normal ROM. Advanced imaging and specialist referral recommended. Repeat x-rays in 10 days if fracture remains a possibility, alternatively consider referral for CT.

Rotator cuff tendonitis:

- Ultrasound is preferred over MRI for large rotator cuff tears and & biceps pathologies. It is highly operator-dependant and is significantly less expensive than MRI.
- Radiographs are not initially indicated, however may be useful if ruling out suspected comorbidities is important.

Impingement syndrome:

- Subacromial bursa inflammation on MRI correlates with impingement tests.

Chronic tendonitis, bursitis, DJD:

- **Osteoarthritis (DJD):** Radiographs indicated if unrelieved by 4 weeks of conservative care or suspected underlying specific cause (pathology).
- **Glenohumeral joint inflammatory arthritis:** Early MRI and rheumatologist referral is recommended in suspected septic and rheumatic arthritis.
- **Bursitis:** MRI is useful for assessing subacromial bursa effusion.

Adhesive capsulitis:

- Radiographs are not routinely indicated, but may be used to exclude complicating factors.
- Arthrography is frequently used to evaluate capsular restrictions and may provide relief if rupture of adhesions occurs during the procedure.

Labrum tear:

- MRI is superior to US for assessing labrum tears.
- Adding MRI with the shoulder in abduction and external rotation may reveal associated articular-sided rotator cuff tears.
- Greater pain, higher DASH, or restricted extension predicts labrum tear on MRI.
- Arthrogram may be useful in detection of labrum tear.

Dislocation:

- **Glenohumeral instability:** Radiographs, advanced imaging and specialist referral recommended.
 - Note that post-reduction, it is important to obtain AP views with a Y view, and if possible, an axillary view to detect commonly associated Hill-Sachs fractures, humeral tuberosity fractures, and glenoid rim fractures.

Dinnes 2003
Ardic 2006

PROGNOSTIC AND MANAGEMENT INDICATORS

There are significant differences at baseline between asymptomatic participants and clinical cases in physical health, perception of general health, and social support.

Silverstein 2006

	<p><u>Risk factors for shoulder pain:</u></p> <ul style="list-style-type: none"> • Duration of employment - Prolonged employment (10 years) in shoulder stressing occupations was associated with supraspinatus tendinitis, shoulder pain with and without disability. • Repetitive work. • Awkward working position (e.g. sitting for long periods of time, reaching overhead) and concurrent exposure to multiple exposures (manual handling, working with hands above shoulders, working with vibration) increased risk. • Physically demanding work (e.g. lifting >50 kg per hour at or above shoulder level). • Job dissatisfaction, low level of control at work , little support. • Anxiety, mental stress. • Age - older age (workers over 50) was associated with sustaining severe shoulder sprain/strain and time loss associated with shoulder injury. • Gender (<i>Female</i>) • Obesity (<i>BMI>30</i>) • High job related mechanical exposure was associated with heightened risk for neck and shoulder pain in men and women. • High psychological job demands with low job decision latitude was associated with increased neck and shoulder pain in women. 	<p>van der Windt 2000 Alipour 2008 Svendson 2004 Leclerc 2004 Miranda 2001a Grooten 2007 Andersen 2007</p> <p>Miranda 2001b Zheng 2005 Kelsh 2009 Ostergren 2005</p>
WORKERS' COMPENSATION ASSESSMENT ISSUES		
<p>Causation & Work Relatedness</p>	<p>Exceptionally clear medical justification for specific work exposure(s) is essential for fair and timely decisions. In Washington State, occupational conditions that may be a result of cumulative workplace exposure across multiple employers may have claim and experience costs apportioned to both former and current employers. Worker and employer appeals rights can factor into adjudication decisions and contribute to delays that are associated with worse outcomes.</p>	<p>Franklin 2007 Bonfiglioli 2006</p>

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OCCUPATIONAL SHOULDER CONDITION CONSERVATIVE INTERVENTIONS

<p>Manipulation & mobilization (glenohumeral, acromioclavicular, cervico-thoracic)</p>	<p>General shoulder pain/restriction:</p> <ul style="list-style-type: none"> • A Dutch study of 150 patients presenting with both neck and shoulder pain assessed cervico-thoracic spinal manipulation (not including shoulder manipulation) of up to 6 sessions in 12 weeks combined with usual medical care (including corticosteroid injection) compared to usual medical care alone. At 12 weeks, 43% of the combined group reported full recovery compared to 21% of the usual care group. No difference in full recovery rates were reported at 6 weeks and one year. Study limits included potential contamination of discretionary additional regions of manipulation. • Fifty-two men and women were randomly assigned to either an exercise only treatment group or an exercise with manual therapy group. All subjects were diagnosed with shoulder impingement syndrome, rotator cuff tendinitis, or shoulder tendinitis. Both groups improved in function and pain, however, improvement was significantly greater among those in the manual therapy plus exercise group. • A posteriorly directed joint mobilization technique was more effective than anteriorly directed mobilization technique for improving external rotation ROM in patients. Both directions of mobilization significantly reduced pain. <p>Shoulder pain/restriction attributed to “shoulder girdle” (cervical and thoracic spine and scapular regions) lesion (pain/restriction with non-specific findings)</p> <ul style="list-style-type: none"> • A Dutch study of 198 patients categorized diagnostically into two groups: shoulder girdle lesions (pain & restriction with non-specific clinical findings) and synovial lesions (attributed to subacromial structures (i.e. the AC and GH joints, with localized clinical findings). The shoulder girdle group consisted of 58 patients was randomized to manipulation (non-standardized, therapist discretion) and physiotherapy (modalities). At 5 weeks, 70% of manipulation patients reported themselves as fully recovered compared to 10% of the physiotherapy group. <p>Shoulder pain/restriction attributed to “subacromial girdle” (acromioclavicular and glenohumeral joint) lesion (pain & restriction with specific localized findings)</p> <ul style="list-style-type: none"> • The synovial lesion group from the above study (Winters 1997) consisted of 114 patients was randomized to manipulation (non-standardized, therapist discretion), physiotherapy (modalities), and corticosteroid injection. At 5 weeks, 75% of corticosteroid injection group manipulation patients reported themselves as fully recovered compared to 40% of the manipulation group and 20% of the physiotherapy group. <p>Impingement syndrome:</p> <ul style="list-style-type: none"> • Two small trials have demonstrated that active ROM, stretching and strengthening exercise combined with modalities and education was more effective in providing short term improvements in pain & function (range of motion, strength, activity) than modalities and education alone. Functional improvement was sustained over the longer term. Adding Maitland mobilization provided substantial addition benefit in pain reduction at 4 weeks. • Another small RCT (n=30) reported significant 1 month pain reduction (VAS, SFMPQ, algometry) and ROM improvement in impingement syndrome patients for EMT compared to detuned ultrasound. • A pre-test/post-test study (n=56) assessed thoracic thrust manipulation on patients diagnoses with shoulder impingement syndrome. Significant decreases in self-reported measures pain (numeric pain scale),function (Neer impingement sign, Hawkins impingement sign, resisted empty can sign, resisted internal rotation, active abduction) and disability (SPADI) scores were reported at 48 hours post treatment. <p>Rotator cuff tendonitis:</p> <ul style="list-style-type: none"> • A systematic review of 11 published trials concluded that combining mobilization with exercise resulted in additional benefit when compared to exercise alone for rotator cuff disease. <p>Chronic tendonitis, bursitis, DJD in elderly:</p>	<p>Bergman 2004</p> <p>Bang 2000</p> <p>Johnson 2007</p> <p>Winters 1997, 1999</p> <p>Winters 1997, 1999</p> <p>Green 2003 Conroy 1998</p> <p>Munday 2007</p> <p>Boyles 2009</p> <p>Kuhn 2009</p>
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	<ul style="list-style-type: none"> • A small randomized study of 29 elderly patients with chronic, symptomatic shoulder degenerative changes compared osteopathic muscle-energy manipulation (end range contract-relax techniques) to end range positioning with no contract relax technique. Both groups reported short-term improvement in pain and range of motion with the contract-relax group sustain the benefit while the control groups benefit decreased over several months. <p>Adhesive capsulitis:</p> <ul style="list-style-type: none"> • A randomized trial of 100 adhesive capsulitis patients compared 12 weeks of high grade mobilization (passive stretch at end/painful range) versus low grade (passive movement within pain free range only). High grade had slightly better disability scores and greater ROM (external rotation and passive abduction) at 1 year than patients treated with low grade mobilization. • In a small 4 group trial of steroid injection, ice, mobilization and placebo showed no differences in pain and function at 4 weeks, although a slightly faster improvement was seen with steroid injections. <p>Summary:</p> <p>Mobilization is reasonably well studied, high velocity manipulation is poorly studied. More aggressive mobilization compares more favorably to less aggressive forms. Effects seen in studies are with 5-24 sessions within 12-16 weeks and benefit usually detectable/reported within 4-6 weeks.</p> <p>The Council on Chiropractic Guidelines and Practice Parameters (CCGPP) have made the following expert opinion statements regarding High-Velocity Manipulation:</p> <p>The expert opinion of the CCGPP Upper Extremity Team supports the use of high-velocity, short-amplitude (HVSA) manipulation (adjustment) of the shoulder with some recommendations for use that include avoidance of any anticipated risk. Further evaluation and management may be required for patients with a failure to respond to treatment within a reasonable period of time.</p> <ul style="list-style-type: none"> • For all patients who have fracture, suspected fracture, dislocation, severe generalized or local osteoporosis, infection, tumor, or infection HVSA manipulation is contraindicated. • For patients who have had surgery of the shoulder, consider date of surgery, extent of surgery, type of procedure, and other related factors in making decisions about use of HVSA manipulation. • For all patients, an evaluation for joint stability must be performed. Based on the findings, it is recommended that no HVSA manipulation be used for patients with medical subluxation, hypermobility syndromes (e.g. Marfan's, Ehlers-Danlos syndrome), or gross looseness indicating multidirectional instability. Mobilization such as applying a load-and-shift or Maitland grade 1-4 type of translational movement may be appropriate in these case settings. • For patients with adhesive capsulitis or any acute inflammatory condition such as rheumatoid arthritis, active hemarthrosis or extensive swelling, rheumatoid variant disease, crystalline disease (e.g. gout), or acute bursitis it is recommended not to use HVSA. There is some literature evidence that aggressive mobilization may worsen or prolong the natural history of adhesive capsulitis. Based on this evidence and the experience of our panel, we feel that an HVSA approach is highly risky for certainly the early stages of adhesive capsulitis. For the middle and later stages of adhesive capsulitis chiropractors should consider a progressive application of increasing the grade of amplitude of manipulation. It is recommended that by using patient feedback and response as a guide, increasing grades of amplitude may be applied. • For patients with impingement syndrome with a known structural cause (e.g. type 3 acromion, arthritis, etc.), we strongly recommend that any HVLA manipulation not be applied in a superior direction. 	<p>Knebl 2002</p> <p>Vermeulean 2006</p> <p>Bulgen 1984</p> <p>Souza 2009</p>
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<p>Modalities</p>	<p>With few exceptions, physiotherapeutic modalities are generally of little benefit for most shoulder conditions.</p> <p>General shoulder pain/restriction:</p> <ul style="list-style-type: none"> • Bipolar interferential current was no better than placebo in improving pain and function in a randomized trial of 145 general shoulder pain patients. • Laser was ineffective in reducing pain or improving active motion in a small randomized trial (n=40) that compared 10 exercise sessions with laser to exercise with detuned laser. <p>Rotator cuff tendonitis:</p> <ul style="list-style-type: none"> • Ultrasound, pulsed electromagnetic field, or laser were no better than placebo in two trials. • Pulsed electromagnetic field was associated with reduced short term pain for rotator cuff disease in the short term. <p>Chronic tendonitis, bursitis, DJD:</p> <ul style="list-style-type: none"> • Ultrasound & pulsed electromagnetic field were reported in one study to be better than placebo for pain associated with calcific tendonitis. In addition radiographic appearance of tendon calcification improved. <p>Adhesive capsulitis:</p> <ul style="list-style-type: none"> • Laser treatment provided short term pain improvement for adhesive capsulitis in three trials. • No evidence that physiotherapy modality interventions alone were of benefit. 	<p>Green 2003</p> <p>Bingol 2005</p> <p>Ebenbichler 1999 Dal Conte 1990 Binder 1984</p> <p>Ebenbichler 1999 Dal Conte 1990</p> <p>Vecchio 1993 Dacre 1989</p>
<p>Soft tissue techniques (Massage, trigger point, passive stretch etc)</p>	<p>Adhesive capsulitis:</p> <ul style="list-style-type: none"> • The Cyriax method of rehabilitation (deep friction massages and mobilization exercises) provides a faster and better response than the conventional physical therapy methods in the early treatment phase of patients. 	<p>Guler-Uysel 2004</p>
<p>Exercise</p>	<p>General shoulder pain/restriction:</p> <ul style="list-style-type: none"> • Supervised exercise therapy, corticosteroid injections with multiple physical modalities, and range of motion exercises have all been shown effective for short term reduction shoulder pain. • A trial, with a two and a half year follow up demonstrated sustained significant benefit with respect to function for exercise over placebo in rotator cuff disease. • Rapidity of muscle response measured by EMG in trapezius myalgia patients is improved by strength training compared to nonspecific general fitness training. • Based on a systematic review of randomized controlled trials of patients who were treated for various complaints of arm, neck, or shoulder pain & restriction, there is limited evidence supporting the effectiveness of exercise compared to massage alone, massage as an add-on to manual therapy, and manual therapy as an add-on to exercise. No differences between types of exercises have been reported in studies comparing different types of exercise. <p>Rotator cuff tendonitis:</p> <ul style="list-style-type: none"> • In a Canadian randomized trial of postal workers with complaints of chronic rotator cuff tendonitis 85 patients were randomized into naturopathic care (anti-inflammatory diet counseling, acupuncture, enzyme supplementation) and physical exercise (passive, active assisted, and active exercise with a matched supplementation placebo). Both groups improved with the naturopathic care group achieving better function and quality of life scores. • Based on a systematic literature review of 11 randomized trials, exercise was effective in improving shoulder pain and function in subjects with rotator cuff impingement syndromes. Supervised exercise was no more effective than home exercise, however, the addition of manual therapy enhanced the magnitude of the effect. • Supervised exercise regime may be of benefit in the short and long term for mixed shoulder disorders and rotator cuff 	<p>Ginn 2005</p> <p>Brox 1993, 1997</p> <p>Coghlan 2008</p> <p>Anderson 2009</p> <p>Jurgel 2005</p> <p>Verhagen 2007</p> <p>Szczurko 2009</p> <p>Kuhn 2009</p> <p>Brox 1993</p>

	<p>disease.</p> <ul style="list-style-type: none"> Exercise was demonstrated to be effective in terms of short term recovery in rotator cuff disease (RR 7.74 (1.97, 30.32), and longer term benefit with respect to function (RR 2.45 (1.24, 4.86)). <p>Impingement syndrome:</p> <ul style="list-style-type: none"> Progressive resistance training in patients with shoulder impingement syndrome was demonstrated to be effective in reducing pain and improving function. Exercises also help decrease analgesic and NSAID use. Low quality evidence suggests exercise and mobilization may improve pain and function in subacromial impingement syndrome. <p>Adhesive capsulitis:</p> <ul style="list-style-type: none"> Individualized 4 weeks rehabilitation program improved shoulder ROM except for internal and external ROM. Exercise therapy and rehabilitation also increased shoulder muscle isometric strength and endurance, and decreased shoulder pain. <p>Types of exercise</p> <ul style="list-style-type: none"> There are many specific approaches within the physical therapy, sports medicine, and chiropractic literature on types of shoulder exercises for improving range of motion and strength. All should be performed gradually with incremental increases in degree of motion as condition and comfort permit. The key is regular incremental increases in movement distances and loading. Kuhn provided some basic low tech evidence-based exercises for impingement syndrome summarized below: <ul style="list-style-type: none"> Range of Motion: Simple postural exercises beginning within patient tolerance including <i>Shoulder shrugs</i>, <i>Shoulder retraction</i> (place hands on hips and lean back), <i>Glenohumeral motion</i> (lean forward supporting one side on a table edge and swing free arm in small to increasingly larger circles). Progress gradually to active assisted movements- <i>Frontal arm elevation</i> (hold a cane with both hands in a supine position starting with hands/cane over hip region and lift arms up and towards head as far as patient tolerance allows; gradually increase distance over time as comfort permits); <i>Lateral arm elevation</i> (in front of mirror, raise arms laterally without shrugging shoulders, gradually increasing distance as progress is made); <i>Anterior shoulder stretch</i> (stand with hands at shoulder level and lean forward onto a door or corner of the room and hold the stretch); <i>Posterior shoulder stretch</i> (cross affected arm in front of chest and place elbow of opposite arm underneath to help pull until involved arm is stretched to tolerance). Strengthening Exercises: Focus should be on rotator cuff and scapular stabilizing musculature, again to patient tolerance. For rotator cuff- <i>Resisted internal and external rotation</i> (can be done upright with elastic band moving band with bent elbow side to side creating rotation of the humerus. Alternate with resistance to internal rotation then external rotation; can also be done in side laying using small hand weights); For scapular stabilizers- <i>Chair press</i> (while seated place hands at side of body on chair and attempt to lift body up from chair); <i>Push up</i> (on all fours, arch upper back using hands pressed against floor to really push the back ceiling-ward); <i>Press up</i> (Lying on back extend arm straight up gripping weight in hand. Push weight ceiling-ward); <i>Upright rows</i> (Lean forward against table. Hang free arm down, gripping weight. Pull weight up, using shoulder and keeping elbow straight); <i>Seated/Standing rows</i> (with arms abducted and elbows bent, pull elastic bands back by pinching shoulder blades together); <i>Low trapezius</i> (stand with arms at side and pull elastic band backwards). 	<p>Ginn 1997</p> <p>Lombardi 2008</p> <p>Michener 2004</p> <p>Jurgel 2005</p> <p>Kuhn 2009</p>
<p>Acupuncture</p>	<p>Based on a Cochrane Review of 9 randomized controlled trials, the evidence supporting benefit of acupuncture is limited.</p> <p>General shoulder pain/restriction:</p> <ul style="list-style-type: none"> One small trial (n=52) showed significant improvement in range of motion after acupuncture compared to placebo 4 weeks post-intervention; however, the difference was no longer significant after 4 months. 	<p>Green 2005</p>

	<ul style="list-style-type: none"> In other studies, no significant difference in improvement was observed when comparing acupuncture to steroid injections, ultrasound (n=60), or mobilization (n=24). Additionally, no significant difference in adverse events was demonstrated when comparing acupuncture to placebo therapy. <p>Adhesive capsulitis:</p> <ul style="list-style-type: none"> A small trial (n=35) comparing acupuncture and exercise to exercise alone for adhesive capsulitis showed a significant difference favoring acupuncture plus exercise. This improvement was observed for 5 months. <p>Shoulder pain/restriction attributed to “subacromial girdle” (acromioclavicular and glenohumeral joint) lesion (pain & restriction with specific localized findings)</p> <ul style="list-style-type: none"> In a Spanish randomized trial of 425 chronic, unilateral subacromial pain patients, single point acupuncture in association with physiotherapy improves shoulder function and alleviates pain compared with physiotherapy as sole treatment. Pain was assessed using a numeric pain scale; Shoulder function was assessed using the Constant-Murley Score (CMS) which combines pain, daily activities, range of motion and strength. 	Vas 2008
<p>Other Non-surgical Interventions</p>	<p><u>Taping</u></p> <p>Rotator cuff tendonitis:</p> <ul style="list-style-type: none"> Elastic taping over the lower trapezius muscle to elevate the scapula improved symptoms and muscle function in baseball players with rotator cuff impingement. <p><u>Steroid injections</u></p> <p>Rotator cuff tendonitis:</p> <ul style="list-style-type: none"> Corticosteroid injections are superior to physiotherapy (modality) interventions. <p>Impingement syndrome:</p> <ul style="list-style-type: none"> Both blind and US-guided injection techniques are equally accurate; thus blind injections should be the technique of choice. <p>Adhesive capsulitis:</p> <ul style="list-style-type: none"> Intraarticular corticosteroids have additive effects related to rapid pain relief, mainly in the first weeks of the exercise treatment period. At twelve weeks, combination of corticosteroid injection and therapeutic exercise is equally effective compared to therapeutic exercise alone. Corticosteroid injections are effective for capsulitis of the shoulder in the short term. Physical therapy is effective in improving ROM at 6 weeks. Failure to improve is probably less likely with injections AND physical therapy. Physical therapy gives the best results in capsulitis treatment. Sodium hyaluronate (SH) injections can be used as an alternative to PT and steroid injections. There is no significant difference in outcomes for hydrodilatation with injection of corticosteroid and injection of corticosteroid alone. <p><u>Oral steroids & NSAIDS</u></p> <p>Adhesive capsulitis:</p> <ul style="list-style-type: none"> Based on a Cochrane review of 5 small randomized trials (n=149), oral steroids may decrease pain and disability and improve ROM in the shoulder in the short term. The benefits of oral steroids, however, may not last past 6 weeks. Adverse effects are minimal in those who take oral steroids. There is limited evidence demonstrating a significant 	<p>Hsu 2009</p> <p>van der Windt 1998 Berry 1980 Winters 1997, 1999 Bulgen 1984</p> <p>Bal 2008</p> <p>Ryans 2005</p> <p>Calis 2004</p> <p>Tveita 2008</p> <p>Rutten 2007</p> <p>van der Windt 1995 Buchbinder 2006</p>

	<p>difference between oral steroids and steroid injections.</p> <p><u>Naturopathic Management</u></p> <p><i>Rotator Cuff Tendinitis:</i></p> <ul style="list-style-type: none"> • A combination of counseling for an anti-inflammatory diet, acupuncture, and Phlogenzym (an anti-inflammatory hydrolytic enzyme) may benefit patients with rotator cuff tendinitis. In a randomized controlled trial of 85 Canadian postal workers, this combination resulted in significantly lower pain scores and significantly higher SF-36 scores (physical, mental, emotional, social) compared to exercise alone. Further studies are needed to determine the benefit of an anti-inflammatory diet, acupuncture, and a hydrolytic enzyme independently. <p><u>Capsular Distention Therapy / Hydrodilatation</u></p> <p><i>Adhesive capsulitis:</i></p> <ul style="list-style-type: none"> • Distention of the articular capsule occurs during steroid injections and when arthrograms are performed. Injecting air has also been used to distend the capsule. There have been reports of improved pain and function following such procedures attributed to rupturing of restrictive adhesions. A Cochrane review on distention therapy concluded there is evidence that arthrographic distention with saline and steroid provides short-term benefits in pain, range of movement and function in adhesive capsulitis but it is uncertain whether this is better than alternative interventions. • A randomized trial involving 76 patients compared a series of three steroid injections with hydrodilatation to three steroid injections without hydrodilatation and found no differences between groups. 	<p>Szczurko 2009</p> <p>Buchbinder 2008</p> <p>Tveita 2008</p>
Surgical Interventions	<p><i>Rotator cuff tendonitis:</i></p> <ul style="list-style-type: none"> • Based on the most recent available Cochrane Collaboration review of 14 randomized trials, there are no significant differences in outcome between open or arthroscopic subacromial decompression surgery and active non-operative treatment for rotator cuff impingement. Evidence from six trials indicates there are no significant differences in safety or outcome between arthroscopic and open subacromial decompression although four trials reported earlier recovery with arthroscopic decompression. <p><i>Dislocation:</i></p> <ul style="list-style-type: none"> • Based on a Cochrane review of 4 small randomized trials (n=163), surgery can significantly reduce subsequent instability, either redislocation or subluxation (partial dislocation) in patients who have a primary anterior shoulder dislocation as a result of injury. Such patients may also see a greater improvement in function compared to those treated conservatively. 	<p>Handoll 2004</p> <p>Coghalan 2004</p>
WORKERS' COMPENSATION INTERVENTION ISSUES		
Employer Contact/ Accommodation	<p>This is considered a best practice in occupational health in order to facilitate effective return to work, however no studies were found specific to occupational shoulder conditions.</p> <ul style="list-style-type: none"> • Interviews of injured workers in Ontario with prolonged claims identified numerous system and bureaucratic issues that were significant factors in prolonging a claim, particularly systematic issues impeding implementation of return-to-work options. 	<p>MacEachen 2010</p>
Administrative Interventions <i>(e.g., breaks, duration)</i>	<p>No studies were identified regarding the effectiveness of administrative ergonomic interventions for occupational shoulder conditions specifically.</p> <ul style="list-style-type: none"> • There is evidence that breaks from computer work has been shown to reduce arm and hand discomfort generally. 	<p>Verhagen 2007</p>

<p>Ergometric Interventions (e.g., engineering interventions, work site modification, multiple component interventions)</p>	<p>No specific studies on work and task modification for recovery from occupational shoulder injuries were identified in our searches. Potentially related studies may help inform some clinical issues for modifying shoulder work.</p> <ul style="list-style-type: none"> • Training new assembly line workers on lower stress upper body and arm postures was associated with lower incidences of shoulder and arm complaints compared to untrained controls in their first year of employment. No differences were found between trained and untrained experience assembly line workers however. • Experimental findings showed that posturing hands above shoulder level significantly increased the risk of LMF and postural discomfort even in light-weight manual assembly environs where postural exertions are small, and that cross-modal matching estimates and postural tremor were more sensitive metrics of LMF in the shoulder complex than EMG RMS voltage and mean spectral power frequency metrics. • For various neck, arm, shoulder pain & restriction complaints, a systematic review of randomized studies concluded that evidence for ergonomic interventions over no interventions is conflicting. There is limited evidence that breaks during prolonged computer work is beneficial in symptom reduction. • In a randomized controlled trial of 200 subjects who use a visual display terminal for at least 20 hours per week, ergonomic intervention plus an informative brochure resulted in greater improvement in posture and musculoskeletal symptoms than the brochure alone. Ergonomic intervention included advice and supervision from a physical therapist, adjustment of workstations, adjustment and alteration of existing furniture and equipment, and postural advice during daily tasks. The brochure included information on work posture and the benefit of “microbreaks”. • One-hundred eighty two call center operators were randomized to one of four groups: ergonomic intervention, intervention plus trackball (mouse) use, intervention plus forearm support board, or intervention plus trackball (mouse) and forearm support board. The armboard significantly reduced neck and shoulder pain and right upper extremity pain. A wide forearm support board may be beneficial to patients with upper body musculoskeletal disorders and pain after several weeks of use. 	<p>Parenmark 1988</p> <p>Wiker 1989</p> <p>Verhagen 2007</p> <p>Pillastrini 2007</p> <p>Rempel 2006</p>
<p>Conditioning and Work Hardening Interventions</p>	<ul style="list-style-type: none"> • Workplace-based rehabilitation intervention is more effective than conventional clinic-based rehabilitation in terms of decrease in perceived pain and disability, improvement in function, and prevention of further work disability. A job coach can help minimize psychosocial problems that interfere with return to work (e.g. separation from work, peer group and/or the employer). 	<p>Cheng 2007</p>
<p>Personal Controls (e.g., ergonomics training, splint wearing, EMG biofeedback, and on-the-job exercise programs)</p>	<ul style="list-style-type: none"> • In a randomized controlled trial of 79 female computer-users with work-related neck & shoulder complaints, myofeedback therapy plus ergonomic counseling improved pain intensity and disability. The odds of improvement, however, were not significantly different than those for ergonomic counseling alone. Ergonomic counseling involved keeping a diary and tracking pain intensity. The patient was evaluated based on work tasks, hours, loads, stations, and methods. Ways to improve were discussed with patient. The key was to adjust workplace rather than buy new equipment. Patients were monitored over 4 weeks. Myofeedback training plus ergonomic counseling was implemented among the second group. • In a randomized controlled trial of 36 women, myofeedback training plus ergonomic counseling benefited those who had high levels of initial discomfort and disability and especially those who ignored their pain. 	<p>Voerman 2007</p> <p>Voerman 2008</p>

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