



Complete Summary

GUIDELINE TITLE

Diagnostic imaging guideline for musculoskeletal complaints in adults - an evidence-based approach. Part 2: upper extremity disorders.

BIBLIOGRAPHIC SOURCE(S)

Bussieres AE, Peterson C, Taylor JA. Diagnostic imaging guideline for musculoskeletal complaints in adults-an evidence-based approach-part 2: upper extremity disorders. J Manipulative Physiol Ther 2008 Jan;31(1):2-32. [164 references] [PubMed](#)

GUIDELINE STATUS

This is the current release of the guideline.

The literature review and the guidelines should be updated every 3 years.

COMPLETE SUMMARY CONTENT

SCOPE
METHODOLOGY - including Rating Scheme and Cost Analysis
RECOMMENDATIONS
EVIDENCE SUPPORTING THE RECOMMENDATIONS
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS
QUALIFYING STATEMENTS
IMPLEMENTATION OF THE GUIDELINE
INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES
IDENTIFYING INFORMATION AND AVAILABILITY
DISCLAIMER

SCOPE

DISEASE/CONDITION(S)

Musculoskeletal disorders of the upper extremities

GUIDELINE CATEGORY

Diagnosis
Evaluation
Risk Assessment

CLINICAL SPECIALTY

Chiropractic
Emergency Medicine
Family Practice
Geriatrics
Orthopedic Surgery
Physical Medicine and Rehabilitation
Radiology
Sports Medicine

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Chiropractors
Health Care Providers
Health Plans
Hospitals
Nurses
Physical Therapists
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

- To assist chiropractors and other primary care providers in decision making for the appropriate use of diagnostic imaging for upper extremity disorders
- To assist current and future health care providers to make appropriate use of imaging studies, providing indications for the need of imaging studies according to current literature and expert consensus, and assisting in optimizing the utilization of limited available resources
- To reduce unnecessary radiation exposure and the use of specialized imaging studies, increase examination precision and decrease health care costs—all without compromising quality of care

TARGET POPULATION

Adult patients presenting with musculoskeletal disorders of the upper extremities

Note: Children and pregnant patients are excluded from these guideline recommendations.

INTERVENTIONS AND PRACTICES CONSIDERED

Diagnostic Assessment

1. Computed tomography (CT)
2. Magnetic resonance arthrography (MRA)
3. Magnetic resonance imaging (MRI)
4. Nuclear medicine (bone scan)
5. Range of motion (ROM)
6. Ultrasound (US)
7. Plain film radiograph

- Anteroposterior (AP) internal rotation
- AP external rotation
- Axillary view
- Y-scapula view (lateral in scapular plane)
- Posteroanterior (PA) chest view
- Cervical spine AP and lateral views
- Grashey view
- Medial oblique of the wrist and hand

MAJOR OUTCOMES CONSIDERED

- Accuracy of diagnostic tests
- Utility of radiologic examinations in differential diagnosis
- Swelling and pain
- Range of motion
- Speed of return to normal activity level
- Reinjury rates

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

A comprehensive search of the English and French language literature was conducted using a combination of subject headings and keywords.

NUMBER OF SOURCE DOCUMENTS

Recommendations for diagnostic imaging guidelines of adult upper extremity disorders are supported by over 126 primary and secondary citations.

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Levels of Evidence

Classification based on Stroke Prevention and Educational Awareness Diffusion (SPREAD) validated methodological criteria.

1++: High-quality meta-analyses without heterogeneity, systematic reviews of randomized controlled trials (RCTs) each with small confidence intervals (CI), or RCTs with very small CI and/or very small alpha and beta

1+: Well-conducted meta-analyses without clinically relevant heterogeneity, systematic reviews of RCTs, or RCTs with small CI and/or small alpha and beta

1-: Meta-analyses with clinically relevant heterogeneity, systematic reviews of RCTs with large CI, or RCTs with large CI and/or alpha or beta

2++: High-quality systematic reviews of case-control or cohort studies. High-quality case-control or cohort studies with very small CI and/or very small alpha and beta

2+: Well-conducted case-control or cohort studies with small CI and/or small alpha and beta

2-: Case-control or cohort studies with large CI and/or large alpha or beta

3: Nonanalytic studies, (e.g., case reports, case series)

4: Expert opinion

- (minus): Meta-analyses with clinically relevant heterogeneity; systematic reviews of trials with large confidence intervals; trials with large CIs, and/or large alpha and/or beta

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Methods for Synthesizing Evidence

1. Literature search and independent literature assessment of spinal disorders: Quality of diagnostic accuracy studies (QUADAS), Appraisal of Guidelines Research and Evaluation (AGREE), and Stroke Prevention and Educational Awareness Diffusion (SPREAD).
2. Initial draft: Template based on European Commission classification (2001)
3. Expert consensus: A 2-round modified Delphi process was used to generate consensus among an international panel of over 50 experts in musculoskeletal disorders.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

A Delphi panel composed of international experts on the topic of musculoskeletal disorders in chiropractic radiology, clinical sciences, and research was invited to review and propose recommendations on the indications for diagnostic imaging.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Grades of Recommendation

The Stroke Prevention and Educational Awareness Diffusion (SPREAD) tool has been developed to grade recommendations according to the strength of available scientific evidence (level A to D)

A: At least one meta-analysis, systematic review or RCT rated as 1++, and directly applicable to the target population; or a systematic review of RCTs or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population and demonstrating overall consistency of results

B: A body of evidence including studies rated as 2++, directly applicable to the target population and demonstrating overall consistency of results; or extrapolated evidence from studies rated as 1++ or 1+

C: A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or extrapolated evidence from studies rated as 2+**

D: Evidence level 3 or 4; or extrapolated evidence from studies rated as 2+; or evidences from trials classified as (minus) regardless of the level

Good practice point: Recommended best practice based on the clinical experience of the guideline development group, without research evidence.

This tool aims to evaluate the scientific evidence according to prespecified levels of certainty (1++ to 4). In this study, Good Practice Point also represents consensus of the Delphi panel. CI indicates confidence intervals.

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Clinical Validation-Pilot Testing
Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The guidelines were pilot tested and peer-reviewed by practicing chiropractors and by chiropractic and medical specialists.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The grades of recommendations (A-D and GPP) and levels of evidence (1++, 1+, 1-, 2++, 2+, 2-, 3, 4) are defined at the end of the "Major Recommendations" field.

Table 1. Adult Shoulder Disorders

Patient Presentation	Recommendations
<p>Adult patients with full or limited movement and nontraumatic shoulder pain of less than 4-weeks (wk) duration</p> <p>Patients unlikely to require initial radiographic examination if: no precipitating fall, no sudden onset of pain or swelling, no palpable mass or deformity; no pain at rest, and normal range of motion (ROM) (adapted from Fraenkel et al., 2000) prospective validation needed).</p>	<p>Radiographs not initially indicated (B)</p>
<p>General indications for radiographs include:</p> <ul style="list-style-type: none"> • No response to care after 4 wk • Significant activity restriction >4 wk • Nonmechanical pain (unrelenting pain at rest, constant or progressive symptoms and signs, pain not reproduced on assessment) • Red flags indicators <p>Most patients with chronic shoulder pain can be adequately evaluated with a history, physical examination, and plain radiographs.</p>	<p>If radiographs are indicated (C)</p> <p>Anteroposterior (AP) internal rotation, AP external rotation, axillary view, Y-scapula view (lateral in scapular plane)</p> <p>Additional views: Posteroanterior (PA) chest view, cervical spine AP and lateral views, Grashey view</p> <p>Advanced imaging and specialist referral recommended even if conventional radiographs are unremarkable if there is: (C)</p> <ul style="list-style-type: none"> • Pain and significant disability lasting over 6 mo, despite attention to occupation and sporting factors • In the absence of clinical improvement after 4 wk of therapy • If function does not improve or deteriorates • History of instability, or acute,

Patient Presentation	Recommendations
	<p>severe post-traumatic acromioclavicular pain</p> <ul style="list-style-type: none"> In presence of a potentially serious pathology as suggested by the patient history, examination, and/or radiograph <p>Special investigations (B)</p> <p>Magnetic resonance imaging (MRI), ultrasonography, computed tomography (CT)</p>
<p>Glenohumeral joint disorders</p> <p>Consult specific clinical diagnoses and related patient presentations for additional help in decision making.</p>	
Specific Clinical Diagnoses	
<p>1. Rotator cuff disorders (tendinopathy)</p> <p>MC cause of shoulder pain</p> <p>Classified according to its clinical progression:</p> <p>I. Acute inflammation (tendinitis/bursitis)</p> <p>II. Degeneration/chronic inflammation (tendinitis)</p> <p>III. Rupture and arthritis</p> <p>A. Impingement: Night pain, upper arm pain and tenderness, cuff weakness, atrophy, painful arc, painful crepitation</p> <p>High-sensitivity tests (0.8): Neer, Hawkins, horizontal adduction, Jobe, impingement sign and painful arc</p> <p>High-specificity tests (0.8): drop arm test, yergason, speed, passive external rotation</p>	<p>Radiographs not initially indicated (D)</p> <p>Early radiograph if soft tissue calcification is expected</p> <p>If radiographs are indicated (D)</p> <p>AP internal rotation, AP external rotation, axillary view</p> <p>Additional view: Neer's view (y-scapula) or Acromio-clavicular joint (A-C) joint views</p> <p>Special investigations (C)</p> <p>MRI is gold standard.</p> <p>A. Impingement is a dynamic process which may be assessed by US</p> <p>B. Rotator cuff full and partial thickness tear: MRI, Ultrasound (US), Magnetic resonance arthrography (MRA) improves diagnostic accuracy</p> <p>C. Calcifying bursitis within cuff</p>

Patient Presentation	Recommendations
<p>B. Rotator cuff tear: Traumatic in young people and atraumatic in elderly; there is strong evidence that clinical tests are able to rule-out full tears but have questionable value for partial tears: 3 positive tests or 2 if >60 years of age (YOA) is predictive of a tear: supraspinatus weakness, external rotation weakness, Hawkins</p>	<p>tendons: MRI</p>
<p>2. Adhesive capsulitis (frozen shoulder)</p> <ul style="list-style-type: none"> • Onset typically between the ages of 40-65 years (y) • Progressive deep joint pain and stiffness of spontaneous onset and restricted activities • >50% loss of passive abduction and external rotation, usually loss of all ROM, pain at end range, no local tenderness 	<p>Radiographs not routinely indicated (D)</p> <p>Special investigations (D)</p> <ul style="list-style-type: none"> • MRI with direct or indirect arthrogram • Distended arthrogram
<p>3. Osteoarthritis (DJD)</p> <p>Usually ≥60 YOA, progressive pain, crepitus, decreased end-ROM, tender joint</p>	<p>Radiographs indicated if (D)</p> <ul style="list-style-type: none"> • Unrelieved by 4 wk of conservative care • Suspected underlying specific cause (pathology) <p>AP internal rotation, AP external rotation, axillary view, Y-scapula view (lateral in scapular plane)</p> <p>Additional views: Supraspinatus outlet view</p>
<p>4. Glenohumeral joint inflammatory arthritis</p> <p>Involved in most forms of inflammatory arthritis (Rheumatoid arthritis [RA], gout, reactive arthritis [Reiter's], Juvenile rheumatoid arthritis [JRA],</p>	<p>Radiographs indicated (D)</p> <p>AP internal rotation, AP external rotation, axillary view</p> <p>Additional views: Grashey view</p>

Patient Presentation	Recommendations
<p>Ankylosing spondylitis [AS])</p>	<p>Advanced imaging and specialist referral recommended (D/GGP)</p> <p>In suspected septic arthritis, consider MRI promptly for complete assessment of glenohumeral joint, preferably with intraarticular gadolinium</p>
<p>5. Glenohumeral instability</p> <p>Usually between the ages of 20 and 35 y, history (Hx) of dislocation or subluxation, apprehension sign</p> <p>Generalized ligamentous laxity (in multidirectional and voluntary instability)</p>	<p>Radiographs indicated (D)</p> <p>AP internal rotation, AP external rotation, axillary view, Y-scapula view (lateral in scapular plane)</p> <p>Advanced imaging and specialist referral recommended (C)</p> <ul style="list-style-type: none"> • Acute setting: conventional MRI • Chronic instability: MRA • Postoperative shoulder, multislice CT arthrography
<p>Adult patients with significant shoulder/glenohumeral joint trauma</p> <p>Radiographic examination is appropriate if there is trauma sufficient to produce fracture, or dislocation, with accompanying signs/symptoms compatible with fracture or dislocation.</p> <ul style="list-style-type: none"> • Loss of normal shape, palpable mass or deformity • Severely restricted shoulder mobility • Examination is unable to localize anatomical structure responsible for patient symptoms • History of epileptic seizure or electrical shock <p>Clinical decision rule in suspected shoulder dislocation may include*:</p> <ul style="list-style-type: none"> • First-time dislocation • Blunt trauma (fall >1 flight of stairs, assault, or motor vehicle crash) 	<p>Radiographs indicated (B)</p> <p>AP neutral view (do not move the shoulder), Y-scapula view (lateral in scapular plane), axillary view (if possible)</p> <p>Additional view: Transthoracic lateral</p> <p>Advanced imaging and specialist referral recommended (D)</p> <p>Repeat films in 10 days if a fracture remains a possibility after normal initial evaluation or refer for Computed tomography (CT) scan. Callus formation or abnormal alignment may be present.</p> <ul style="list-style-type: none"> • MRI • Ultrasound (US) and CT arthrography

Patient Presentation	Recommendations
<ul style="list-style-type: none"> When the clinician is uncertain of the joint position <p>Clinical decision rule in suspected fracture-dislocation may include*:</p> <ul style="list-style-type: none"> First-time dislocation Blunt trauma (fall >1 flight of stairs, a fight/assault episode, or motor vehicle crash) or a motor vehicle crash Age >40 y <p>* Prospective validation needed</p>	
<p>A-C joint disorders</p> <p>Teenage to 50 YOA; usually secondary to trauma or osteoarthritis; pain localized to the AC joint and possible swelling</p>	<p>Radiographs not initially indicated in non traumatic origin (C)</p> <p>If radiographs indicated (D)</p> <p>AP view in a 15° cephalic angulation</p> <p>Stress radiographs (bilateral comparison): the value of stress views remains uncertain.</p> <p>Special investigations (D)</p> <p>CT/MRI useful for pathological/surgical cases, especially in separations of types IV-VI as vascular/ neurological complications can result.</p> <ul style="list-style-type: none"> US if CT and MRI not available

Table 2. Adult Elbow Disorders

Patient Presentation	Recommendations
<p>Adult patients with full or limited movement and nontraumatic elbow pain of less than 4 wk duration</p>	<p>Radiographs not initially indicated (C)</p>
<p>General indications for radiographs include:</p>	<p>Indicated before other imaging studies (B)</p>

Patient Presentation	Recommendations
<ul style="list-style-type: none"> • No response to care after 4 wk • Significant activity restriction >4 wk • Non mechanical pain (unrelenting pain at rest, constant or progressive symptoms and signs, pain not reproduced on assessment) • Red flag indicators <ul style="list-style-type: none"> • History of cancer, signs or symptoms (S&S) of cancer, unexplained deformity, palpable enlarging mass, or swelling, significant unexplained elbow pain with no previous films (tumor?) • Red skin, fever, systemically unwell (infection?) • History of noninvestigated trauma, loss of mobility in undiagnosed condition, loss of normal shape (unreduced dislocation? Instability?) • Trauma, acute disabling pain and significant weakness • Unexplained significant sensory or motor deficit (neurological lesion?) 	<p>AP in full extension, lateral at 90° and medial oblique views</p> <p>Additional views: AP in pronation, tangential (axial)</p> <p>Advanced imaging and specialist referral recommended even if conventional radiographs are unremarkable if there is: (C)</p> <ul style="list-style-type: none"> • Pain and significant disability despite attention to occupation and sporting factors • In the absence of clinical improvement after 4 wk of therapy • If function does not improve or deteriorates • History of instability, or acute, severe posttraumatic injury • In presence of a potentially serious pathology as suggested by the patient history, examination and/or radiograph • High-field-strength MRI provides greater detail than mid-field or low-field MR systems • CT and US may be more optimal than a low-field magnet in evaluation of the elbow
<p>Chronic elbow pain in the adult patient</p>	<p>Radiographs indicated (C)</p> <p>AP in full extension, lateral at 90° and medial oblique views</p> <p>Additional views: AP in pronation, tangential (axial)</p> <p>Medical referral recommended and advanced imaging recommended (C)</p> <p>When the etiology is uncertain and the patient has failed appropriate</p>

Patient Presentation	Recommendations
	conservative therapeutic trials (see recommendation above).
Specific Clinical Diagnoses	
<p>1. Lateral epicondylitis (tennis elbow)</p> <p>Epicondylar pain AND tenderness at the elbow laterally AND pain on resisted wrist extension—Cozen test:</p> <p>2. Medial epicondylitis (Golfers' elbow)</p> <p>Epicondylar pain AND tenderness at the elbow medially AND pain on resisted wrist flexion.</p>	<p>Radiographs not initially indicated (C)</p> <p>Special investigations not indicated (C)</p> <p>Radiographs not initially indicated (D)</p> <p>Special investigations not indicated (C)</p>
<p>Adult patients with localized elbow pain following trauma</p> <p>Elbow extension test: The inability to fully extend the elbow is a reliable indicator of osseous/joint injury</p> <p>Instability tests: Lateral pivot-shift apprehension test (most sensitive), lateral pivot-shift test, posterolateral rotary drawer test, and stand up test</p>	<p>Radiographs indicated (C)</p> <p>AP in full extension, lateral at 90° and medial oblique views</p> <p>Additional views (C): AP in pronation, tangential view (axial), lateral stress view</p> <p>Special investigations (GPP)</p> <ul style="list-style-type: none"> Increasing use of MRI for the determination of associated injuries of the lateral and medial collateral ligaments and cartilage
<p>Diffuse non-specific pain in the forearm (or wrist)</p>	<p>Radiographs not initially indicated (D)</p>
<p>Forearm pain following trauma</p>	<p>Radiographs indicated (D)</p> <p>AP and lateral views</p>

Table 3. Adult Wrist and Hand Disorders

Patient Presentation	Recommendations
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Patient Presentation	Recommendations
<p>Adult patients with nontraumatic localized wrist and hand pain symptoms</p>	<p>Radiographs not initially indicated (D)</p>
<p>General indications for radiographs include:</p> <ul style="list-style-type: none"> • No response to care after 4 wk • Significant activity restriction >4 wk • Non mechanical pain (unrelenting pain at rest, constant or progressive symptoms and signs, pain not reproduced on assessment)—(e.g., Keinbock's disease) • Red flag indicators <ul style="list-style-type: none"> • Signs and Symptoms (S&S) of cancer, unexplained deformity, palpable enlarging mass, or swelling, significant unexplained wrist pain with no previous films (tumor?) • Red skin, fever, systemically unwell (infection?) • History of noninvestigated trauma, loss of mobility in undiagnosed condition, loss of normal shape (unreduced dislocation? Instability?) (Trauma section) • Trauma, acute disabling pain and significant weakness • Unexplained significant sensory or motor deficit (neurological lesion at the wrist?) • Suspected associated inflammatory arthropathies of wrist and hand <p>Specific indications for radiographs include:</p> <ul style="list-style-type: none"> • Noninvestigated chronic wrist and 	<p>If radiographs are indicated (C)</p> <p>PA, lateral, and medial oblique views of the wrist Additional views: Radial and ulnar deviation views or clenched fist views are reserved for more subtle problems</p> <p>Special investigations (D)</p> <ul style="list-style-type: none"> • The combination of standard radiographs and US can diagnose a wide variety of disorders. • MRI is the procedure of choice to exclude osteonecrosis, marrow, and joint disease including infection.

Patient Presentation	Recommendations
<p>hand pain</p> <ul style="list-style-type: none"> • Multiple sites of Degenerative joint disease (DJD) as visualized on radiographs • Possible Triangular fibrocartilage complex (TFCC) abnormality • Possible wrist instability, including perilunate instability, dorsal and volar intercalated segmental instability, scapholunate advanced collapse, scapholunate dissociation, ulnar translocation of the wrist—Trauma section • Possible operative candidate <p>Consult clinical presentation with related specific clinical diagnoses for additional help in decision making</p>	
Specific Clinical Diagnoses	
<p>1. Tendinopathy of the wrist</p> <p>Pain and tenderness over a specific tendon or tendon group are the hallmarks of this condition. Other findings include localized swelling, impaired function, crepitus, pain with passive stretching of the tendon, and positive provocative testing. Tendinosis, however, can be asymptomatic.</p>	<p>Radiographs not initially indicated (D)</p> <p>If radiographs are indicated (D)</p> <p>PA, lateral, and medial oblique views of the wrist</p> <p>Consider conventional radiography, in persistent painful "soft tissue injuries," not only to exclude bony injury but also to aid diagnosis (Dx) of rare cases of acute spontaneous calcific peritendinitis of the hand and wrist</p>
<p>2. De Quervain's tenosynovitis (stenosing tenosynovitis or tenovaginitis)</p> <p>Pain over the radial styloid AND tender swelling of first extensor compartment AND EITHER pain reproduced by resisted thumb extension OR positive Finkelstein's test</p> <p>Associated symptoms include warmth and crepitus (Naredo et al, 2002)</p>	<p>Radiographs not initially indicated (D)</p>
<p>3. Carpal Tunnel Syndrome (CTS)</p>	<p>Radiographs not initially indicated (C)</p>

Patient Presentation	Recommendations
<p>Pain OR paraesthesia OR sensory loss in median nerve distribution in at least 2 of the first 4 fingers AND either one positive Tinel's or Phalen's, Thenar atrophy, female gender, obesity (body mass index ≥ 30), worsening of symptoms at night/awakening, or abnormal nerve conduction time</p> <p>Clinical prediction rule (level IV):</p> <ol style="list-style-type: none"> 1. Age >45 y 2. Shaking hands for symptom relief 3. Reduced median sensory field of thumb 4. Wrist ratio index (carpal canal volume) >.67 5. Symptom Severity Scale (SSS) score (Brigham and Women Hospital) >1.9 <p>Likelihood of CTS increase with number of positive tests (18.3 or 90% when all 5 tests positive)</p>	<p>Special investigations (D)</p> <p>Advanced imaging reserved for patients with equivocal presentation or with diabetes and diffuse peripheral neuropathy that confounds electrodiagnostic studies</p> <ul style="list-style-type: none"> • MRI may be used to image anatomical abnormality (e.g., space-occupying lesion such as a ganglion). • US may be a useful alternative. • High-resolution sonography may show median nerve enlargement and increased hypoechogenicity
<p>4. Osteoarthritis</p> <ol style="list-style-type: none"> 1. History: age >50 y, morning joint stiffness <30 minutes (min) 2. Physical examination: crepitation, bony tenderness, bony enlargement, no palpable warmth <p>Other characteristics include: long standing pain, no extraarticular symptoms; nonresponsive to Nonsteroidal Antiinflammatory Drugs (NSAIDs), or corticosteroid medication; relieved with rest; deformity or fixed contracture, joint effusion; insidious onset</p>	<p>Radiographs not initially indicated (D)</p> <p>It is common to have incomplete concordance between pathologic changes, radiographic and clinical features in osteoarthritis (OA).</p>
<p>5. Inflammatory or crystal induced arthropathy (excluding Rheumatoid arthritis[RA])</p> <p>Gout, Calcium pyrophosphate dihydrate crystal deposition disease (CPPD), etc</p>	<p>Radiographs indicated (C)</p> <p>PA, lateral, and medial oblique of the wrist and hand</p> <p>Special investigations (C)</p>

Patient Presentation	Recommendations
<p>Dx of inflammatory arthritis is primarily based on history and physical examination:</p> <ul style="list-style-type: none"> • Unrelenting morning stiffness >30 min • Pain at rest • Pain or stiffness better with light activity (during remission) • Polyarticular involvement, especially the hands • Palpable warmth • Joint effusion • Diffuse tenderness • Decreased ROM • Fever/chills or other systemic symptoms • Responsive to NSAID or corticosteroid medication • Flexion contracture in long-standing arthritis 	<ul style="list-style-type: none"> • If routine radiographs are normal or nondiagnostic, MRI is the study of choice; biopsy/aspiration to rule out (R/O) infection • Gadolinium-enhanced MRI of the hand and wrist is a superior technique for detection of tenosynovitis in inflammatory arthritis
<p>6. RA</p> <p>Symmetrical involvement of wrist, metacarpophalangeal and proximal interphalangeal finger joints</p> <p>RA diagnostic criteria ($\geq 4/7$ required):</p> <ul style="list-style-type: none"> • Morning joint stiffness >1 hour (h) • Arthritis involving ≥ 3 joints for at least 6 wk • Hand arthritis (wrist, metacarpophalangeal joint (MCP), proximal interphalangeal joint [PIP]) • Symmetric arthritis • Rheumatoid nodules • Serum Rhesus (Rh) factor • Radiographic changes 	<p>Radiographs indicated (C) PA, lateral, and medial oblique views of the wrists and hands (Norgaard's/ball catcher projection)</p> <p>Radiographs of the hands, feet, and chest are recommended at the initial evaluation</p> <p>Special investigations (C)</p> <ul style="list-style-type: none"> • MRI is the modality of choice in early Dx and management of RA. MRI helps differentiate erosive from nonerosive disease.
<p>7. Osteonecrosis (avascular necrosis [AVN])</p> <p>Nonmechanical pain</p>	<p>Radiographs indicated (C)</p> <p>PA, lateral, and medial oblique</p>

Patient Presentation	Recommendations
<ul style="list-style-type: none"> • Unrelenting pain at rest • Constant or progressive symptoms and signs • Pain not reproduced on assessment • Swelling, tenderness 	<p>Special investigations (D)</p> <p>MRI modality of choice to evaluate bone marrow changes in early stages</p>
<p>8. Complex regional pain syndrome (CRPS)</p> <p>Synonyms:</p> <ul style="list-style-type: none"> • Reflex sympathetic dystrophy • Sudek's atrophy <p>At least 4 of the following must be present in order for a Dx of CRPS to be made:</p> <p>Examination findings:</p> <ul style="list-style-type: none"> • Temperature/color change • Edema • Trophic skin, hair, nail growth abnormalities • Impaired motor function • Hyperpathia/allodynia • Sudomotor changes <p>Associated conditions:</p> <ul style="list-style-type: none"> • Fractures or other trauma • Central nervous system (CNS) and spinal disorders • Peripheral nerve injury 	<p>Radiographs indicated (D)</p> <p>PA, lateral, and medial oblique</p> <p>Special investigations (D)</p> <ul style="list-style-type: none"> • MRI is useful in detecting numerous soft tissue and earlier bone and joint processes that are not depicted or as well characterized with other imaging modalities • 3-phase Nuclear medicine (NM) scan recommended if radiograph is not diagnostic
<p>9. Suspected Triangular fibrocartilage complex (TFCC) lesion (articular disk)</p> <p>Typically produces ulnar-sided wrist pain, which may become chronic and associated with clicking or popping sounds with certain movements</p>	<p>Radiographs indicated (D)</p> <p>PA, lateral, and medial oblique</p> <p>Special investigations (D)</p> <p>MRI and gadolinium-enhanced MRI</p>

Patient Presentation	Recommendations
<p>10. Trigger finger (TF) (stenosing tenosynovitis)</p> <p>Intermittent, troublesome locking of the digit in flexion. More common in women 40-60 YOA and in patients with diabetes, RA, gout, and other connective tissue disorders</p> <p>Patients typically present with an insidious onset of morning pain and snapping, clicking, locking, or stiffness in the affected digit. A painful nodule may be palpable at the distal palmar crease. The nodule may move during active movement</p>	<p>Radiographs not initially indicated (D)</p>
<p>Acute wrist trauma in the adult patient</p> <p>The following evaluation helps predict or rule out (R/O) fractures when no deformity is present:</p> <ul style="list-style-type: none"> • Pain on passive and active motion • Localized tenderness and edema • Pain with grip and resisted supination 	<p>Radiographs indicated (C)</p> <p>PA, lateral and pronation-oblique views (medial oblique) of the wrist</p> <p>A. Additional views (D) PA ulnar deviation (20°), lateral oblique, maximal wrist extension and ulnar deviation</p> <p>B. Additional views (D) stress tests (include PA with closed fist to stress scapholunate ligament)</p>
<p>A. Carpal navicular (scaphoid) fracture:</p> <p>Accounts for 70%-80% of all carpal fractures; Most common (MC) in young active males</p> <p>Anatomical snuffbox tenderness</p> <p>Longitudinal thumb compression</p> <p>Resisted supination</p> <p>B. Suspected lunate instability:</p> <p>Pain centered over the dorsal wrist immediately ulnar to the extensor carpi radialis tendons; pain and abnormal</p>	<p>Special investigations (C)</p> <p>Increasing use of MRI as only examination for:</p> <ul style="list-style-type: none"> • Scaphoid fractures • Pisiform and hamate • Scaphotrapezium-trapezoid joint • Scapholunate instability

Patient Presentation	Recommendations
<p>movement noted on Watson test; Specialized testing may be indicated earlier in such case.</p>	
<p>Acute hand and finger trauma in the adult patient</p> <p>Traumatic injuries to the hand can be evaluated routinely by conventional radiography.</p>	<p>Radiographs indicated (D)</p> <ol style="list-style-type: none"> 1. Hand: PA, lateral and pronation-oblique (medial oblique) 2. Isolated finger: PA, lateral, pronation-oblique (AP for the thumb) <p>Additional views (GPP) Stress view of the thumb to identify gamekeeper's thumb (possible avulsion fracture of the thumb proximal phalangeal base)</p> <p>Special investigations (D)</p> <ul style="list-style-type: none"> • Consider advanced imaging (MRI, US, or arthrography) in suspected Stener lesion (entrapment of the ulnar collateral ligament) with gamekeeper's fractures.

Definitions:

Levels of Evidence

Classification based on Stroke Prevention and Educational Awareness Diffusion (SPREAD) validated methodological criteria.

1++: High-quality meta-analyses without heterogeneity, systematic reviews of randomized controlled trials (RCTs) each with small confidence intervals CI), or RCTs with very small CI and/or very small alpha and beta

1+: Well-conducted meta-analyses without clinically relevant heterogeneity, systematic reviews of RCTs, or RCTs with small CI and/or small alpha and beta

1-: Meta-analyses with clinically relevant heterogeneity, systematic reviews of RCTs with large CI, or RCTs with large CI and/or alpha or beta

2++: High-quality systematic reviews of case-control or cohort studies. High-quality case-control or cohort studies with very small CI and/or very small alpha and beta

2+: Well-conducted case-control or cohort studies with small CI and/or small alpha and beta

2-: Case-control or cohort studies with large CI and/or large alpha or beta

3: Nonanalytic studies, (e.g., case reports, case series)

4: Expert opinion

– (minus): Meta-analyses with clinically relevant heterogeneity; systematic reviews of trials with large confidence intervals; trials with large CIs, and/or large alpha and/or beta

Grades of Recommendation

This tool has been developed to grade recommendations according to the strength of available scientific evidence (level A to D)

A: At least one meta-analysis, systematic review or RCT rated as 1++, and directly applicable to the target population; or a systematic review of RCTs or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population and demonstrating overall consistency of results

B: A body of evidence including studies rated as 2++, directly applicable to the target population and demonstrating overall consistency of results; or extrapolated evidence from studies rated as 1++ or 1+

C: A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or extrapolated evidence from studies rated as 2+**

D: Evidence level 3 or 4; or extrapolated evidence from studies rated as 2+; or evidences from trials classified as (minus) regardless of the level

Good practice point: Recommended best practice based on the clinical experience of the guideline development group, without research evidence.

This tool aims to evaluate the scientific evidence according to prespecified levels of certainty (1++ to 4). In this study, Good Practice Point also represents consensus of the Delphi panel. CI indicates confidence intervals.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

[References open in a new window](#)

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Selection of appropriate radiological imaging procedures for evaluation of patients with musculoskeletal disorders of the upper extremities; decrease unnecessary ionizing radiation exposure, decrease costs, and improve accessibility.

POTENTIAL HARMS

Although somewhat controversial, it is important to remember that health hazards of all forms of radiation are cumulative. The Biological Effects of Ionizing Radiation (BEIR VII) 2005 report released by the National Academy of Sciences adds further support to the "linear-no-threshold" model of cancer risk from ionizing radiation exposure. In summary, this report concludes that ionizing radiation is dangerous even at low doses and that there are no safe limits. Given the potential risks associated with conventional radiography, only appropriate clinical indications can justify its use.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- These guidelines are intended to address issues faced by first contact professionals only. These guidelines do not address all possible conditions associated with musculoskeletal disorders, only those that account for the majority of initial visits to a practitioner.
- Like other diagnostic tests, imaging studies should only be considered if (a) they yield clinically important information beyond that obtained from the history and physical examination, (b) this information can potentially alter patient management, and (c) this altered management has a reasonable probability to improve patient outcomes.
- Investigators and collaborators in the development of these imaging guidelines believe that liability insurance companies, third party payers, and courts of law should not rely solely on descriptions of patient presentations, proposed recommendations, and/or corresponding comments found throughout the documents, as patient presentations are unique and the application of any guideline always requires clinical judgment and thus needs to be considered in the proper context. In addition, laws and regulations may vary between geographical regions and should be considered when applying the proposed indications for any imaging study.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

Publication, applying to National Guideline Clearinghouse, Posting of the electronic document on various Web sites (malpractice insurance carriers, outpatient teaching clinics); educational intervention strategies (e-learning, community pilot studies); referral guidelines reinforced by request checking and clinical management algorithms; promotion by national, provincial, and state organizations; and conferences.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Living with Illness

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Bussieres AE, Peterson C, Taylor JA. Diagnostic imaging guideline for musculoskeletal complaints in adults-an evidence-based approach-part 2: upper extremity disorders. J Manipulative Physiol Ther 2008 Jan;31(1):2-32. [164 references] [PubMed](#)

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2008 Jan

GUIDELINE DEVELOPER(S)

Canadian Protective Chiropractic Association - Professional Association
l'Université du Québec à Trois-Rivières - Academic Institution

SOURCE(S) OF FUNDING

l'Université du Québec à Trois-Rivières
Canadian Protective Chiropractic Association

GUIDELINE COMMITTEE

Not stated

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

The research team involved in the development of these guidelines declares no existing or potential conflict of interest. No investigators have received nor will receive any personal financial benefits or derive any salary from this project.

GUIDELINE STATUS

This is the current release of the guideline.

The literature review and the guidelines should be updated every 3 years.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [Journal of Manipulative and Physiological Therapeutics](#).

Print copies: Available from Bussi eres, Andr e, department chiropratique, Universit e du Qu ebec   Trois-Rivi eres, C.P. 500, Trois-Rivi eres, Qu ebec, Canada G9A 5H7; E-mail: andre.bussieres@uqtr.ca.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- Diagnostic imaging practice guidelines for musculoskeletal complaints in adults - an evidence-based approach: introduction. *J Manipulative Physiol Ther* 2007 Nov-Dec;30(9):617-683.

Electronic copies: Available in Portable Document Format (PDF) from the [Journal of Manipulative and Physiological Therapeutics](#).

Print copies: Available from Bussi eres, Andr e, department chiropratique, Universit e du Qu ebec   Trois-Rivi eres, C.P. 500, Trois-Rivi eres, Qu ebec, Canada G9A 5H7; E-mail: andre.bussieres@uqtr.ca.

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI Institute on February 23, 2009. The information was verified by the guideline developer on March 24, 2009.

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