

ACOEM Practice Guidelines: Elbow Disorders

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Objective: The American College of Occupational and Environmental Medicine has updated the treatment guidelines in its Elbow Disorders chapter through revision processes begun in 2006. This abbreviated version of that chapter highlights some of the evidence and recommendations developed.

Methods: Comprehensive systematic literature reviews were accomplished with article abstraction, critiquing, grading, evidence table compilation, and guideline finalization by a multidisciplinary expert panel and extensive peer-review to develop evidence-based guidance. Consensus recommendations were formulated when evidence was lacking and often relied on analogy to other disorders for which evidence exists. A total of 108 high- or moderate-quality trials were identified for elbow disorders. **Results:** Guidance has been developed for 13 major diagnoses and includes 270 specific recommendations. **Conclusion:** Quality evidence is now available to guide treatment for elbow disorders, particularly for lateral epicondylalgia.

Nontraumatic musculoskeletal disorders (MSDs) constitute 65% of all occupational illnesses in the United States, and work-related elbow disorders are among the most common causes of reported occupational injuries and workers' compensation claims.¹ In 2011, MSDs accounted for 33% of all workplace injuries requiring time away from work in the United States, statistically unchanged from 2010, but a 5% increase compared with 28% of total days-away-from-work cases in 2010.^{2,3} There were a total of 387,820 MSDs in the United States in 2011, requiring a median of 11 days away

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from work, 3 more than the median of 8 days for all days-away-from-work cases.² Upper extremity MSDs, including elbow disorders, now account for at least 4% of all US state workers' compensation claims, an increase from the 1% seen a decade ago.⁴⁻⁶ In 1998, the state of Washington alone reported that elbow disorders accounted for the third highest incidence claims rate, with 29.7 injuries per 10,000 full-time employees.⁷

Lateral epicondylalgia (pain in the lateral epicondyle area) affects approximately 1% to 3% of the population and is the most commonly diagnosed condition of the elbow. Lateral epicondylalgia reportedly occurs with greater frequency among individuals whose activities require strong gripping or repeated wrist movements. Those between the ages of 35 and 50 years are at high risk with the dominant arm most frequently affected.⁸⁻¹⁰

Ulnar neuropathies at the elbow, including cubital tunnel syndrome, are the second most common group of compressive neuropathies, after carpal tunnel syndrome.¹¹ Nevertheless, ulnar neuropathies do not always produce symptoms, making it difficult to calculate true incidence. One study found that in 16.2% of the general population, the ulnar nerve slipped out of its olecranon groove when the elbow was flexed—flexion being a reputed risk factor.¹¹

In 2011, the Institute of Medicine (IOM) released two reports addressing clinical practice guidelines and systematic reviews.^{12,13} IOM recommendations match the guidelines methods used by the American College of Occupational and Environmental Medicine (ACOEM)¹⁴ in developing its *Occupational Medicine Practice Guidelines*, specifically including quantitative independent systematic reviews, multidisciplinary panels (including a methodologist), conflict of interest disclosures, and an external review process.¹⁴ In addition, this ACOEM Elbow Disorders chapter report represents an update of recommendations originally published in 2007 incorporating additional methodological advances.

There are few guidelines that address elbow disorders,^{15,16} and none of these are comprehensive or systematic guidelines. This article summarizes recommendations

from the Elbow Disorders chapter of the ACOEM *Occupational Medicine Practice Guidelines*. It does not include details on epidemiological review, disability durations, rationale for recommendations, treatment indications, doses, numbers of appointments, frequencies of treatments, indications for discontinuation, or indications for surgery included in the chapter.¹⁷

METHODS

The ACOEM developed a new method in 2006 to begin the process of updating the 2nd edition of its evidence-based *Practice Guidelines*.^{14,18} In 2007, the Elbow Disorders chapter was the first to be revised using those new methods. The chapter was revised again in 2010 for the third edition. A subsequent literature search was conducted in 2011 to early 2013 to further provide up-to-date information for the chapter and this article.

Systematic literature reviews were performed using six databases—EBSCO (including Medline, CINAL, Health Source, Academic Search Primer, Alt Health Watch, Biomedical Reference), Pubmed, Cochrane Central Register of Controlled Trials, Google Scholar, PEDro, and Trip Database. Searches covered the entirety of the databases (eg, 1966 to 2011 for the oldest, Medline). Search terms were designed to be comprehensive.

The Elbow Disorders chapter includes systematic searches for treatments of the following diagnoses: biceps strains and ruptures, contusions, elbow dislocation, fractures, lateral epicondylalgia, medial epicondylalgia, olecranon bursitis, osteoarthritis, osteonecrosis, pronator syndrome, radial neuropathies, triceps strains, and ulnar neuropathies at the elbow. Treatment searches were designed to address all aspects of injury care from self-care to postoperative rehabilitation. Specific topics searched included activities, return to work, medications, physical therapy, manipulation and mobilization, exercise, passive modalities, acupuncture, shock-wave therapy, injections, surgery, and postoperative rehabilitation.

All identified studies were scored for quality.^{14,18} High- (score 8.0 to 11.0) and moderate-quality (score 4.0 to 7.5) randomized trials were included in the evidence tables. As shown in Table 1, the

TABLE 1. Criteria for Strength of Evidence Ratings

Level of Evidence	Number/Quality of Studies
A = Strong evidence base	Two or more high-quality studies*
B = Moderate evidence base	At least one high-quality study or multiple moderate-quality studies*
C = Limited evidence base	At least one study of moderate quality
I = Insufficient evidence†	Evidence is insufficient or irreconcilable

*High-quality studies are scored 8.0 to 11.0 points. Moderate-quality studies are scored 4.0 to 7.5 points.
†Insufficient evidence recommendations are, by definition, consensus-based guidance. These include areas lacking in quality evidence (A to C) or with substantially conflicting evidence.

level of evidence (labeled A, B, or C) was then determined by the number of high- to moderate-quality studies available. High- or moderate-quality trials were required to develop evidence-based guidance on treatment. Low-quality trials were excluded from incorporation as quality evidence and are included in an appendix.

Guidance was then drafted using the tables of evidence that abstracted the high- and moderate-quality trials. Where quality evidence was lacking or conflicting, expert panel consensus was used to develop consensus recommendations, all of which are designated "I" for insufficient evidence. All consensus recommendations in the Elbow chapter received 100% panel agreement. Draft text and tables were forwarded to the multidisciplinary evidence-based practice elbow panel, which reviewed the evidence and finalized the text and recommendations.

The draft third edition chapter and update were externally peer-reviewed. Peer reviewers were identified from professional organizations ($n = 3$) and individuals ($n = 1$) who expressed an interest in peer-reviewing the draft chapter. As some comments were received in aggregate from organizations (eg, from a professional organization's guidelines committee), the exact number of external peer reviewers is unclear, although there were at least 6 identified reviewers for this chapter. Nearly all specific suggestions were incorporated into the final version of the chapter.

This report summarizes many key findings for the updated Elbow Disorders chapter of ACOEM's *Practice Guidelines*.¹⁷ The highest-quality studies are generally cited. The complete guideline, tables of evidence, and comprehensive referencing are available in print or electronic versions.^{17,19} All treatment recommendations are guidance on the basis of the synthesis of the evidence and expert consensus. These are recommendations for practitioners, and decisions to adopt a particular course of action must be made by trained practitioners on the basis of available resources and the particular circumstances presented by the individual patient.

in the absence of major range of motion deficits.

Ergonomic recommendations for the elbow are all consensus recommendations. They include avoidance of high physical demands, especially high force, that seem to be significantly aggravating the condition. Job task modifications may be required when job demands exceed patient tolerance. Nevertheless, without evidence of efficacy, there is no recommendation to require removal from a job unless there is evidence of lack of improvement despite treatment while continuing high job exposures.

Management with medications typically relies upon nonsteroidal anti-inflammatory medications (NSAIDs) in the working-age population. Prevention of gastric effects is addressed comprehensively in the Hip and Groin Disorders chapter.²⁰ Acetaminophen is efficacious in most studies, although comparative trials suggest that acetaminophen is less effective for arthrosis^{20,21} and low back pain²² than NSAIDs. This indirect evidence could be suggestive that acetaminophen may also be somewhat less efficacious than NSAIDs for treatment of other elbow MSDs. Opioids should be avoided other than for very brief, postoperative, or severe injury situations.²³

Nonphysical factors (ie, psychiatric, psychosocial, workplace, or socioeconomic issues) should be investigated and addressed, particularly in cases of delayed recovery or delayed return to work. These factors are often not overtly stated and, therefore, specific inquiries are recommended to identify these issues.

Biceps and Triceps Tendinoses

All recommendations for biceps and triceps tendinoses are made via consensus (I). NSAIDs and acetaminophen are recommended. Slings may be necessary for moderate-sized tears, and posterior splints are often used postoperatively. Opioids are selectively recommended primarily for management immediately postoperatively. Progressive range-of-motion and progressive strengthening exercises are recommended for both nonoperative and operative cases.

Surgery is recommended for complete or large biceps or triceps ruptures. Surgical repair is recommended for select patients with moderately severe cases and failure to adequately recover. Surgical repair is also recommended for those with moderate tears, high physical job demands, or a desire to return to high physical job demands.

Fractures, Dislocations, and Sprains

All recommendations for fractures, dislocations, and sprains are made via consensus (I). Acetaminophen and NSAIDs are

recommended for pain management, although some concerns about NSAIDs delaying fracture healing have been raised.

- Brief use of a few days of opioid treatment is recommended as an option for severe pain management inadequately treated with NSAIDs.
- Elbow slings for nondisplaced and occult radial head fractures are recommended. The use of slings may be reasonable for dislocations and severe sprains.
- Casts are recommended for minimally displaced fractures and other elbow fractures amenable to nonsurgical treatment.
- Surgical fixation is recommended for substantially displaced fractures. Education and exercise may be needed after cast removal.

Lateral Epicondylalgia

Quality studies have not defined the importance of modified work in the management and/or persistence of lateral epicondylalgia. Nevertheless, modified work duties that preclude high-force exertions are recommended (I). Considerations of limitations are also suggested for highly repetitive use (other than light force) or high-amplitude vibration (I).

- Topical and oral NSAIDs have moderate evidence of modest efficacy (B).^{24–26} Two studies found that both oral²⁷ and topical²⁸ piroxicam were inferior to flurbiprofen.
- Acetaminophen does not have evidence of efficacy, but it is a reasonable alternative and may be the first option for patients with contraindications to NSAIDs (I).
- Opioids should be avoided.
- Self-application of heat or ice may be recommended.
- There are no quality studies evaluating the use of elbow straps, although two experimental studies suggest that they may have modest efficacy.^{29,30} Thus, straps are recommended (I).
- Wrist braces may be considered for adjunctive care of either more severe cases or those with suboptimal results with elbow straps and bands (I).³⁰
- No quality studies unequivocally document efficacy of exercises (I). One trial found no differences comparing eccentric with concentric exercises.³¹ Nevertheless, another trial found exercises superior to ultrasound over 2 years.^{32,33} Physical or occupational therapy is recommended (I).
- There is moderate evidence of modest efficacy for iontophoresis with either glucocorticoids³⁴ or NSAIDs (B).^{35–37}
- There is evidence of modest efficacy of ultrasound (C).³⁸

- Glucocorticosteroid injections have some evidence of efficacy (C); nevertheless, results tend to be worse at 1 year with injections, suggesting at least some caution is warranted with these injections.^{39–41}

- There is conflicting evidence about the efficacy of platelet-rich plasma (I)⁴² and autologous blood injections (I).^{43,44}
- Surgery is recommended for cases inadequately responsive to multiple evidence-based treatments (I). Microtenotomy is also recommended (C).⁴⁵ Postoperative care includes NSAIDs and exercises, which have no evidence of efficacy for epicondylitis, although there is evidence of efficacy for both of these treatments for postoperative care of other disorders.
- There is no recommendation for or against the use of massage (including friction massage), magnets and pulsed electromagnetic field, biofeedback, transcutaneous electrical nerve stimulation, electrical nerve stimulation, diathermy, periarticular sodium hyaluronate injections, glycosaminoglycan injections, prolotherapy injections, or sonographically guided percutaneous tenotomy (I).
- Acupuncture is recommended for select chronic patients (I).
- Treatments not recommended are extracorporeal shockwave therapy (A),^{46–48} low-level laser therapy (B),^{49–53} soft tissue mobilization (C),⁵⁴ manipulation or mobilization (C),⁵⁵ phonophoresis (C),^{36,56} polidocanol injections (C),⁵⁷ and botulinum injections (I).

Medial Epicondylalgia

There is little quality evidence regarding treatment for medial epicondylalgia. Exceptions include evidence of efficacy for treatment with iontophoresis that includes glucocorticosteroid³⁴ and glucocorticoid injection.⁵⁸ Corticoid injections seem to have similar clinical results of short-term, but not long-term efficacy. Treatment of these patients by analogy with evidence from patients with lateral epicondylalgia is recommended.

Olecranon Bursitis

All recommendations for olecranon bursitis are made via consensus (I). Aspiration with diagnostic studies for infection and crystals are recommended for potentially infectious bursal effusions. Soft padding of the elbow and avoidance of direct pressure on the olecranon are recommended (I).

- There is no recommendation for the use of NSAIDs or glucocorticosteroid injection for treatment of aseptic bursitis.

- Surgery is recommended for chronic and/or unresolving effusions.

Ulnar Neuropathy at the Elbow (Including Cubital Tunnel Syndrome)

For ulnar neuropathy at the elbow, the only quality trials involve surgical techniques; therefore, all other guidance is based via consensus (I). Although a nerve may be entrapped at any point along its course, there are two major segments for ulnar neuropathy at the elbow^{59,60}—in the condylar groove and cubital tunnel.^{60–62} The risk factors are not the same for these segments and some treatments are likely dissimilar,¹⁷ yet trials have not distinguished between ulnar neuropathies in the condylar groove and cubital tunnel segments, resulting in lack of clarity in the evidence base.

- Electromdiagnostic testing should ideally include “inching technique,” involving stimulation in approximately 1-inch increments along the nerve, to precisely isolate the segment affected.⁶³
- Patients should be taught to sleep with their elbows extended (I), and to avoid hyperflexed (>90°) elbow postures at work or during avocational activities (I). Nocturnal elbow splinting for preventing flexion is recommended (I).
- Exercises are recommended for postoperative rehabilitation particularly if there are significant deficits (I).
- NSAIDs are not recommended other than for postoperative pain management (I).
- Opioids are not recommended except for limited use (a few days to a couple of weeks) for select patients who have undergone recent ulnar neuropathy surgery (I).
- Ultrasound is recommended (I), although on the basis of analogy with carpal tunnel syndrome, it is likely to have only modest efficacy.⁶⁴
- Simple (“in situ”) cubital tunnel surgical decompression is recommended (C).^{65–68} Anterior subcutaneous transposition with or without medial epicondylectomy is also recommended (I). Anterior submuscular transposition is not recommended (I).
- There is no recommendation regarding oral administration or injections of glucocorticosteroids, lidocaine patches, topically administered ketamine, other vitamins, acupuncture, biofeedback, manipulation or mobilization, massage, soft tissue massage, iontophoresis, and phonophoresis. Brief postoperative opioid use may be recommended (I).
- Pyridoxine in the absence of nutritional deficiencies is not recommended (I).
- Magnets and low-level laser therapy are not recommended (I).

Radial Neuropathy at the Elbow (Including Radial Tunnel Syndrome)

No quality trials evaluating radial neuropathy at the elbow were found. All guidance is thus based via consensus (I). Guidance is recommended to parallel treatment for ulnar neuropathy at the elbow.

Pronator Syndrome (Median Neuropathies in the Forearm)

No quality trials evaluating pronator syndrome were found. All guidance is thus based via consensus (I). Guidance is recommended to parallel treatment for ulnar neuropathy at the elbow.

DISCUSSION

Nineteen high-quality and 89 moderate-quality randomized controlled trials were identified to provide a foundation for treatment of the most common MSDs of the elbow. Most trials (89.8%) addressed lateral epicondylalgia. Much of the consensus guidance is based on analogy to other comparable disorders (eg, pyridoxine efficacy in carpal tunnel syndrome patients used for guidance for ulnar neuropathy) for which there are quality trials.

As shown in Table 2, these guidelines closely align with the IOM's recent recommendations for high-quality guidelines.¹² These elbow guidelines have incorporated systematic literature searches involving six databases, abstraction of the studies, careful literature critiques, grading of the evidence, development of guidance through multidisciplinary evidence-based practice panels, extensive peer-review processes, and detailed feedback to reviewers.^{14,18} To further help direct treatment of patients, evidence-based guidance is clearly distinguished from consensus-based guidance.

Weaknesses are identified for numerous interventions thought to be important. Where there are no quality trials, consensus recommendations rather than evidence-based recommendations have been developed. These areas include education, value of work limitations, specific exercise regimens, most surgical approaches, and postoperative rehabilitation. It is hoped that these guidelines will also serve as a foundation for incepting trials to further develop evidence bases to improve the foundation to more effectively treat patients.

Summary of Recommendations for Managing Elbow Disorders

Table 3 summarizes the recommendations for managing most common elbow disorders. Table 4 summarizes the recommendations for ergonomic interventions and return-to-work programs. These recommendations are based on critically appraised higher quality research evidence and on expert consensus observing first principles when higher quality evidence was unavailable or inconsistent. The more detailed indications, specific appropriate diagnoses, temporal sequencing, prior testing or treatment, and contraindications—which are elaborated in more detail for each test or treatment in the guideline¹⁷—should be reviewed for recommendations in clinical practice or medical management. These recommendations are not simple “yes/no” criteria, and the evidence supporting them is in nearly all circumstances developed from typical patients, not unusual situations or exceptions.

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TABLE 2. ACOEM Guidelines Compliance With Institute of Medicine Standards for Trustworthy Guidelines

IOM Standards Areas for Developing Trustworthy Clinical Practice Guidelines	ACOEM Compliance
(1) Establishing transparency	Published, peer-reviewed methodology, ¹⁸ funding from ACOEM BOD.
(2) Management of conflict of interest	Financial and nonfinancial disclosure process detailed in methodology and panelist details published (http://apg-i.acoem.org/Support/Third_Edition_Panel_Member_Disclosures.pdf).
(3) Guideline development group composition	Elbow panel includes orthopedic surgeons, family, sports medicine, and occupational medicine specialists. Patient and public involvement minimal, but not excluded.
(4) Clinical practice guideline–systematic review intersection	Systematic reviews supporting body part areas are conducted specifically for occupational situations; systematic reviews that do not detail occupational data status are excluded.
(5) Establishing evidence foundations for and rating strength of recommendations	Evidence tables for each recommendation are drafted; those with RCT evidence are graded and published.
(6) Articulation of recommendations	Each recommendation follows a similar format: Background Recommendation statement Indications Frequency Reasons for discontinuation
(7) External review	Each update goes through an extensive external review process with relevant stakeholders' details tracked and disposition communicated back. Elbow external reviews were furnished from orthopedic surgery, occupational therapy, and physical therapy associations.
(8) Updating	Literature searches are repeated on an annual basis to find new high-quality evidence. At least every 5 years a complete evidence review process is completed with relevant changes subject to panel approval and external review.

ACOEM, American College of Occupational and Environmental Medicine; IOM, Institute of Medicine; RCT, randomized controlled trial.

TABLE 3. Summary of Recommendations for Managing Elbow Disorders

Elbow Disorder	Treatment With Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
Contusion	Education (I) NSAIDs (I) Acetaminophen (I) Ice (I) Compression (I) Range-of-motion exercises (I) Avoidance of immobilization (I)		
Lateral epicondylalgia (lateral epicondylitis)	Restrict work to tasks that do not involve high-force, stereotypical hand gripping or pinching, or use of high-amplitude vibrating handheld tools (I) Education (I) NSAIDs for acute, subacute, or chronic lateral epicondylalgia (B) NSAIDs for postoperative lateral epicondylalgia (I) Proton pump inhibitors for patients at substantially increased risk for GI bleeding (A) Misoprostol for patients at substantially increased risk for GI bleeding (A) Sucralfate for patients at substantially increased risk for GI bleeding (B) H2 blockers for patients at substantially increased risk for GI bleeding (C) Patients with known cardiovascular disease or multiple risk factors for cardiovascular disease should have the risks and benefits of NSAID therapy for pain discussed (I) Acetaminophen or aspirin as a first-line therapy for patients with cardiovascular disease risk factors (A) Acetaminophen for elbow pain, particularly for patients with contraindications to NSAIDs (I) Topical NSAIDs for acute, subacute, or chronic lateral epicondylalgia (B) Topical NSAIDs for postoperative lateral epicondylalgia (I) Opioids for select treatment of patients with postoperative lateral epicondylalgia (I) Tennis elbow bands, straps, and braces for acute, subacute, or chronic lateral epicondylalgia (I) Cock-up wrist braces for acute, subacute, or chronic lateral epicondylalgia (I) Home exercises for acute, subacute, chronic, or postoperative lateral epicondylalgia (I) Physical or occupational therapy for acute, subacute, chronic, or postoperative lateral epicondylalgia (I) Self-application of heat or cold for acute, subacute, chronic, or postoperative lateral epicondylalgia (I) Iontophoresis with administration of glucocorticosteroids or NSAIDs for acute, subacute, or chronic lateral epicondylalgia (B) Ultrasound for acute, subacute, or chronic lateral epicondylalgia (C) Acupuncture for select patients with chronic lateral epicondylalgia (I)	Massage, including friction massage, for acute, subacute, or chronic lateral epicondylalgia (I) Magnets and pulsed electromagnetic field for acute, subacute, or chronic lateral epicondylalgia (I) Acupuncture for acute, subacute, or postoperative lateral epicondylalgia (I) Biofeedback for acute, subacute, or chronic lateral epicondylalgia (I) Transcutaneous electrical nerve stimulation for acute, subacute, or chronic lateral epicondylalgia (I) Electrical nerve stimulation for acute, subacute, or chronic lateral epicondylalgia (I) Diathermy for acute, subacute, or chronic lateral epicondylalgia (I) Glucocorticosteroid injections for acute lateral epicondylalgia (I) Platelet-rich plasma injections for acute or subacute lateral epicondylalgia (I) Autologous blood injections for acute or subacute lateral epicondylalgia (I) Periarticular sodium hyaluronate and glycosaminoglycan injections for chronic lateral epicondylalgia (I) Prolotherapy injections for acute, subacute, or chronic lateral epicondylalgia (I) Sonographically guided percutaneous tenotomy for acute, subacute, or chronic lateral epicondylalgia (I)	Opioids for acute, subacute, or chronic lateral epicondylalgia (I) Soft tissue mobilization for acute, subacute, or chronic lateral epicondylalgia (C) Manipulation or mobilization for acute, subacute, or chronic lateral epicondylalgia (C) Extracorporeal shockwave therapy for acute, subacute, or chronic lateral epicondylalgia (A) Phonophoresis for acute, subacute, or chronic lateral epicondylalgia (C) Low-level laser therapy for acute, subacute, or chronic lateral epicondylalgia (B) Botulinum injections for acute, subacute, or chronic lateral epicondylalgia (I) Polidocanol injections for acute, subacute, or chronic lateral epicondylalgia (C)

(Continued)

TABLE 3. (Continued)

Elbow Disorder	Treatment With Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
	Glucocorticosteroid injections for highly selective subacute or chronic lateral epicondylalgia (C) Glucocorticosteroid injections using bupivacaine as an adjunct for subacute or chronic lateral epicondylalgia (C) Platelet-rich plasma injections for chronic lateral epicondylalgia (I) Autologous blood injections for chronic lateral epicondylalgia (C) Surgical lateral epicondylar release for chronic lateral epicondylalgia (I) Radiofrequency microtenotomy for chronic lateral epicondylalgia (C)		
Medial epicondylalgia (medial epicondylitis)	As there is almost no quality literature on medial epicondylalgia, treatment of this condition is by analogy to lateral epicondylalgia (see above) and should be considered "insufficient evidence" recommendations		
Olecranon bursitis	Education (I) Soft padding of the elbow, soft elbow supports, and ace wraps (I) Modifying activities to avoid direct pressure over the olecranon and allow time to reabsorb fluid (I) Aspiration of a clinically infected or questionably infected bursa (I) Surgical drainage (I) Surgical resection of the bursa for chronic bursitis with recurrent drainage (I)	NSAIDs (I) Glucocorticosteroid injections (I)	
Elbow fractures, including nondisplaced radial head fractures	NSAIDs and acetaminophen to control pain (I) Elbow slings for nondisplaced and occult radial head fractures (I) Casts for nondisplaced and occult radial head fractures (I) Opioids for select patients with pain (I) Surgical fixation for displaced elbow fractures (I) Education, usually by physical or occupational therapists, for select patients after cast removal (I) Physical or occupational therapy for select patients with functional debilities or those unable to return to work after cast removal (I)		Routine referral for physical or occupational therapy after cast removal for elbow fracture of otherwise healthy patients who are able to return to work (I)
Elbow dislocations	Education (I) NSAIDs and acetaminophen (I) Opioids for select patients with pain (I) Posterior elbow splint and slings (I) Anesthetic, with or without opioid, intra-articular injection(s) either prereduction or postreduction for pain management (I) General anesthesia to facilitate reduction in select patients (I) Surgery to repair elbow joints that either recurrently dislocate or are otherwise unstable after dislocation(s) (I)		
Elbow sprains	Education (I) NSAIDs and acetaminophen (I)		

(Continued)

TABLE 3. (Continued)

Elbow Disorder	Treatment With Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
Biceps tendinosis (or tendinitis) and tears/ ruptures	Opioids for select patients with pain from severe elbow sprains (I) Slings (I) Education (I) NSAIDs and acetaminophen (I) Opioids for select patients with pain from moderately severe to severe biceps tendinosis, particularly with nocturnal sleep disruption; postoperative patients are also candidates (I) Slings and splints for biceps tendinosis, ruptures, and postoperative patients (I) Range-of-motion transitioning to strengthening exercises for biceps tendinosis, ruptures, and postoperative patients (I) Surgical repair of distal biceps rupture (I)		
Triceps tendinosis (or tendinitis) and tears/ruptures	There are no quality studies for this disorder, and thus treatment by analogy to biceps tendinoses and tears/ruptures is recommended (see above)		
Ulnar neuropathies at the elbow (including condylar groove-associated ulnar neuropathy and cubital tunnel syndrome)	Removal from job tasks with repeated or sustained elbow hyperflexion (I) Education (I) Instruction on how to sleep with elbows extended rather than flexed (I) Avoidance of hyperflexed ($>90^\circ$) elbow postures at work or during avocational activities (I) Exercise for rehabilitation of patients with postoperative ulnar neuropathy at the elbow with significant deficits (I) NSAIDs and acetaminophen for postoperative pain management of ulnar neuropathy-related pain (I) Limited use (a few days to couple of weeks) of opioids for select patients who have undergone recent ulnar neuropathy surgery, particularly if complications occurred (I) Nocturnal elbow splinting or bracing for acute, subacute, or chronic ulnar neuropathies at the elbow (I) Ultrasound for acute, subacute, or chronic ulnar neuropathies (I) Simple ("in situ") decompression for patients who fail nonsurgical treatment for subacute or chronic ulnar neuropathies or who have emergent or urgent indications (eg, acute compression because of fracture, arthritides, or compartment syndrome with unrelenting symptoms of nerve impairment) (C) Anterior subcutaneous transposition for patients who fail nonsurgical treatment for subacute or chronic ulnar neuropathies or who have emergent or urgent indications (eg, acute compression because of fracture, arthritides, or compartment syndrome with unrelenting symptoms of nerve impairment) (I) Medial epicondylectomy for patients who fail nonsurgical treatment for subacute or chronic ulnar neuropathies or who have emergent or urgent indications (eg, acute compression because of fracture, arthritides, or compartment syndrome with unrelenting symptoms of nerve impairment) (I)	Exercises for acute, subacute, or chronic ulnar neuropathy at the elbow (I) Oral administration or injections (into the condylar groove or cubital tunnel) of glucocorticosteroids for acute, subacute, or chronic ulnar neuropathies at the elbow. There is no indication for injecting steroids into the cubital tunnel as is done in the carpal tunnel, as there is no other structure than the ulnar nerve in the tunnel and steroid injection into the nerve may cause damage (I) Other vitamins for acute, subacute, or chronic ulnar neuropathies (I) Lidocaine patches for acute, subacute, or chronic ulnar neuropathies with pain (I) Topically administered ketamine for acute, subacute, or chronic ulnar neuropathies with pain (I) Acupuncture for acute, subacute, or chronic ulnar neuropathies at the elbow (I) Biofeedback for acute, subacute, or chronic ulnar neuropathies at the elbow (I) Manipulation and mobilization for acute, subacute, or chronic ulnar neuropathies at the elbow (I) Massage for acute, subacute, or chronic ulnar neuropathies at the elbow (I) Soft tissue massage for acute, subacute, or chronic ulnar neuropathies at the elbow (I)	NSAIDs and acetaminophen as a primary treatment for acute, subacute, or chronic ulnar neuropathies at the elbow (I) Routine use of opioids for acute, subacute, or chronic ulnar neuropathies at the elbow (I) Pyridoxine for routine treatment of acute, subacute, or chronic ulnar neuropathies in patients without vitamin deficiencies (I) Magnets for management of pain for acute, subacute, or chronic ulnar neuropathies (I) Low-level laser therapy for acute, subacute, or chronic ulnar neuropathies (I) Anterior submuscular transposition for subacute or chronic ulnar neuropathies (I)

(Continued)

TABLE 3. (Continued)

Elbow Disorder	Treatment With Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
		Iontophoresis for acute, subacute, or chronic ulnar neuropathies at the elbow (I) Phonophoresis for acute, subacute, or chronic ulnar neuropathies at the elbow (I)	
Radial nerve entrapment (including radial tunnel syndrome)	In the absence of quality evidence for treating these radiculopathies, it is recommended that the treatments for ulnar neuropathy at the elbow (see above) be used to infer treatment for radial neuropathies		
Pronator syndrome (median neuropathies in forearm)	In the absence of quality evidence for treating these radiculopathies, it is recommended that the treatments for ulnar neuropathy at the elbow (see above) be used to infer treatment for median neuropathies		

A = Strong evidence base: Two or more high-quality studies.*
B = Moderate evidence base: At least one high-quality study or multiple moderate-quality studies† relevant to the topic and working population.
C = Limited evidence base: At least one study of moderate quality.
I = Insufficient evidence: Evidence is insufficient or irreconcilable.
*For therapy and prevention, RCTs or crossover trials with narrow confidence intervals and minimal heterogeneity. For diagnosis and screening, cross-sectional studies using independent gold standards. For prognosis, etiology, or harms, prospective cohort studies with minimal heterogeneity.
†For therapy and prevention, well-conducted cohort studies. For prognosis, etiology, or harms, well-conducted retrospective cohort studies or untreated control arms of RCTs.
GI, gastrointestinal; NSAIDs, nonsteroidal anti-inflammatory medications; RCT, randomized controlled trial.
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TABLE 4. Summary of Recommendations for Ergonomic Interventions and Return-to-Work Programs

Recommended	No Recommendation	Not Recommended
In settings with combinations of risk factors (eg, high force combined with high repetition), ergonomic interventions are recommended to reduce risk factors for epicondylalgia (I)	Return-to-work programs for acute, severe elbow MSDs (I)	
In settings with sustained or repeated hyperflexion of the elbow (>90°), ergonomic interventions are recommended to reduce elbow flexion (I)		
Ergonomics training in moderate- or high-risk manufacturing settings (I)		
Return-to-work programs for treatment of subacute or chronic elbow MSDs, particularly for patients with significant lost time (I)		

A = Strong evidence base: Two or more high-quality studies.*
B = Moderate evidence base: At least one high-quality study or multiple moderate-quality studies† relevant to the topic and working population.
C = Limited evidence base: At least one study of moderate quality.
I = Insufficient evidence: Evidence is insufficient or irreconcilable.
*For therapy and prevention, RCTs or crossover trials with narrow confidence intervals and minimal heterogeneity. For diagnosis and screening, cross-sectional studies using independent gold standards. For prognosis, etiology, or harms, prospective cohort studies with minimal heterogeneity.
†For therapy and prevention, well-conducted cohort studies. For prognosis, etiology, or harms, well-conducted retrospective cohort studies or untreated control arms of RCTs.
MSD, musculoskeletal disorder; RCT, randomized controlled trial.
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