ACOEM Hand Wrist Forearm Clinical Practice Guideline

Kurt T. Hegmann, MD, MPH
Professor and Center Director
Dr. Paul S. Richards Endowed Chair in OSH
Rocky Mountain Center for Occupational & Environmental Health
University of Utah
© 2016

Disclosures
- Teach, Research, Clinic, Administration, Consultation
- Teaching and Research Grants (CDC/NIOSH); Utah Labor Commission
- ACOEM Practice Guidelines Chair
- Take care of patients (primary to tertiary)
- Consultations >100 businesses, government entities, insurers, and unions

HWF Guideline Topics
- Carpal Tunnel Syndrome
- Extensor, Flexor Tendinoses
- Trigger Digit
- Scaphoid Fractures
- Other Fractures
- Amputation
- Compartment syndrome/crush inj.
- Lacerations
- Animal, Human Bites
- Kienböck
- Ganglia
- Mallet finger
- Osteoarthrosis
- Non-specific HWF pain
- Ulnar, Radial Neuropathies
- HAVS
- Sprains
- TFCC tears
Steps in the EBM Process

**Devising Clinical Questions**

- Pose an answerable clinical question
  - Most recommend using the PICO format
    - **Patient**
      - Disease entity, risk, population
    - **Intervention**
      - Test, maneuver, prevention or treatment
        - Single intervention preferred
    - **Comparison group**
      - True control group preferred
    - **Outcomes**
      - Function, harms, objective, subjective findings

**APG Methodology**

- **Clinical Questions**
  - PICO
  - Multi-Disciplinary Panel
- **Research**
  - Lit Search
  - Scoring Evidence Tables
  - PICO
  - Panel Chairs
- **Draft Recs**
  - Consensus
  - Final Recs
- **Panel Approval**
  - Medical Society
  - ACOEM Board
- **External Review**
  - Panel Review
  - Electronic Book
- **Publish**
  - Panel Review
  - Electronic Book

**Panel Composition & Training:**

- Multidisciplinary
- 2 hour CME Required
  - Methodologist
Methodology

1. Exhaustive Literature Searches for Randomized Controlled Trials (RCTs) (for treatment)
2. Articles Critiqued
3. Summary Tables Compiled
4. Articles Graded
5. Strength of Article Assigned
6. Summary Evidence and information forwarded to Evidence-Based Practice Panel
7. Guidance (Semi)-Finalized
8. External Peer Review
9. Guidance Finalized

Exhaustive Literature Searches for Randomized Controlled Trials (RCTs) or Crossover Trials:
- The National Library of Medicine’s MEDLARS database (Medline)
- EMB Online
- The Cochrane Central Register of Controlled Trials
- TRIP Database
- CINAHL (Nursing, allied health, physical therapy, occupational therapy, social services)
- EMBASE
- PEDro: Physiotherapy Evidence Database

RCT Scoring Metrics

1. Randomization (0, 0.5, 1.0 pts.)
2. Allocation concealed (0, 0.5, 1.0)
3. Baseline comparability of groups
4. Blinding of patients
5. Blinding of provider
6. Blinding of assessor
7. Avoid co-interventions
8. Compliance Rate
9. Dropout Rate
10. Timing of Assessments
11. Intention to Treat Analysis

Low Quality: 0 - 3.5 points
Moderate Quality: 4 - 7.5 points
High Quality: 8.0+ points
Strength of Evidence

A: Strong evidence-base: Two or more high quality randomized controlled trials.
B: Moderate evidence-base: One high quality or two or more moderate quality randomized controlled trials.
C: Limited evidence-base: At least one study of moderate quality.
I: Insufficient Evidence: Evidence insufficient or irreconcilable. (Consensus recommendations)

ACOEM Evidence-based Recommendations

<table>
<thead>
<tr>
<th>Strongly Recommended</th>
<th>“A” Level Evid.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderately Recommended</td>
<td>“B” Level Evid.</td>
</tr>
<tr>
<td>Recommended</td>
<td>“C” Level Evid.</td>
</tr>
<tr>
<td>Insufficient Quality Evidence Recommended</td>
<td>“I” Level Evid.</td>
</tr>
<tr>
<td>Insufficient Quality Evidence No Recommendation</td>
<td>“I” Level Evid.</td>
</tr>
<tr>
<td>Not Recommended</td>
<td>“C” Level Evid.</td>
</tr>
<tr>
<td>Moderately Not Recommended</td>
<td>“B” Level Evid.</td>
</tr>
<tr>
<td>Strongly Not Recommended</td>
<td>“A” Level Evid.</td>
</tr>
</tbody>
</table>

Quality Guideline Metrics

- Institute of Medicine’s Trustworthy Guidelines: Meet all 20 metrics
- GRADE: Meets all 7 criteria (relies on it and goes beyond)
- AMSTAR: Meets all 11 criteria
- AGREE II: Meets all 23 criteria
Flexor Tendinoses and Trigger Digit

No special tests typically performed. (Saldana 01; Moore 00)
X-rays usually unhelpful. Threshold for testing for diabetes, hypothyroidism, arthritic disorders should be low particularly to prevent other morbidity. (Moore 00; Saldana 01)
Initial care not well defined. "As quality evidence for efficacy of other interventions is lacking and success of injections is strong, arguably, the initial management should be glucocorticosteroid injection." (Nimigan 06)

Splints for select cases (i.e., declining injection).
Splints used prior to advent of injection.
Recommend patient education that injections more effective.
One RCT comparing MCP vs. DIP blocking splints with comparable efficacy (Tarbhai 12)

- Recommended, Evidence (I)
Exercise not generally indicated acutely and most do not require exercise program. For residual deficits, particularly post-operatively, exercise may be needed.
Trigger Digit: Injections

- **Indications** – Triggering digit or symptoms of pain over A-1 pulley consistent with stenosing tenosynovitis. Injection at 1st appointment may be most appropriate initial intervention. (Nimigan 06)
- **Dose** – Optimal dose unknown. Quality studies used betamethasone 6mg, (Baumgartner 07; Murphy 95) depot preparation of methylprednisolone 20mg (Lambert 92); and triamcinolone 1mL (Peters-Veluthamaningal 08) most combined with anesthetic.

- No quality comparisons of doses and need for topical anesthetic. Subcutaneous injection over A-1 pulley as efficacious as attempted intrasheath injection. (Taras 98)
- **Frequency/Duration** – Single injection and results evaluated to document improvement.
- **Indications for Discontinuation** – If partial response, consider repeating at modestly higher dose.
- Strongly Recommended (A)

Trigger Digit: Surgery

- **Open release OR percutaneous release.**
- Percutaneous release is as effective as open release (Eastwood 92, Sato 12, Zynia 11, Gilbera 01, Luehman 99, Tanaka 90, Dierks 08, Cebesoy 07) is faster to perform, requires fewer resources (Gilbera 01, Cebesoy 07) involves less pain, and results in faster recovery. (Cebesoy 07)
- **Indications** – Triggering digit or symptoms of stenosing tenosynovitis unresponsive to 1+ injection, or inadequate response. IF no response to injection, consider possible alternate conditions. Adjunctive surgical treatment with glucocorticosteroid injection could be considered. (Mannert 03) although evidence is one moderate-quality study.
- Moderately Recommended (B)
Extensor Compartment Tendinoses, including deQuervain’s Stenosing Tenosynovitis

**NSAIDs**

NSAIDs (oral or topical) recommended to control pain from extensor compartment tenosynovitis.

One trial of ketoprofen patch vs. placebo (Mazieres 05)

- **Dose** – Optimal dose unknown. No quality comparative trials. Regularly scheduled dosing recommended for acute, significantly symptomatic presentations.
  - Recommended (C)

**Splints**

Thumb spica splints for acute and subacute wrist compartment tendinoses, and non-spica wrist splints for other compartment tendinoses.

One RCT: Full-time compared with PRN splint use and found no differences. (Menendez 15).

- **Frequency/Duration** – Generally recommended to wear while awake.
- **Indications for Discontinuation** – Failure to respond or resolution.
  - Recommended, Insufficient (I)
Extensor: Iontophoresis w/Steroid or NSAID

- Indications – Generally fail prior NSAIDs, splints, and activity modifications or decline injection.
- Dose – Glucocorticoid generally used; however, quality studies for lateral epicondylalgia with NSAIDs via iontophoresis (see Elbow Disorders chapter); thus, appear reasonable for this as well.
- Frequency/Duration – Generally 2-3 appointments; additional 4-6 if efficacious. If improvements continue at 6, 4-6 more reasonable.
- Recommended, Insufficient (I)

Extensor: Injections

- Indications – Generally 1+ week non-invasive treatment to see if resolves without injection. Reasonable to initially inject, but no quality evidence. Failure or suboptimal resulted additional injection(s) in minority which is (are) usually successful. (Anderson 91; Sakai 02; Peters-Veluthamanagil 09). Consider repeat injections with modestly higher dose.
- Dose – Optimal dose unknown. Studies of methylprednisolone acetate 40mg (Anderson 91), and triamcinolone acetonide 10mg (Sakai 02). Adjuvant anesthetic typically used. (Anderson 91; Sakai 02).
- No maximum number of injections to treat episode or in a lifetime.
- Recommended, (C)

Extensor: Surgery

- Surgical release is recommended for failure to respond to injection. (Lapidus 72)
- Indications – Wrist compartment tenosynovitis that fails to respond to non-operative interventions, generally including at least 2 glucocorticosteroid injections.
- Recommended, Insufficient (I)
Scaphoid: x-rays

X-rays for diagnostic purposes including **at least 3 to 4 views** including “scaphoid view.” (Schubert 00)

- **Recommended, Insufficient Evidence (I)**

Follow-up x-rays in 2 weeks recommended for evaluation of potential scaphoid fracture, (Leslie 81) particularly with high clinical suspicion of fracture, but negative initial x-rays.

- **Recommended, Insufficient Evidence (I)**

Scaphoid: Imaging

MRI for occult scaphoid fracture when clinical suspicion remains high despite negative x-rays. MRI may reduce cost by reducing lost time (Brooks 05; Brismar 98; Ganel 79; Tiel-Van Balen 93a, 93b; Murphy 95)

- **Moderately Recommended (B)**

Bone scan for occult scaphoid fracture.

- **Recommended (C)**

High spatial resolution sonography

- **Recommended (C)**

CT imaging for occult scaphoid fracture when clinical suspicion and negative x-rays. One retrospective case series with 22% of 118 positive on CT, but negative on x-ray (Nguyen 08).

- **Moderately Recommended (B)**

Scaphoid Fractures: Meds

NSAIDs and acetaminophen to control pain associated with scaphoid fractures.

- **Recommended, Insufficient (I)**
Scaphoid Fracture: Casting

Low Risk Fractures (<1mm displacement, non-oblique, not involving proximal 1/3): Casting long used [usually Colles’ wrist approx. 20° anatomic extension (functionally neutral posture); some use thumb spica cast]. Successful union in 88% to 95% (Dias 2005). Cast has lower rates of subsequent osteoarthrosis than fixation (Skirven 94). Cast Duration: 6-8 wks, then re-xray. Recast if not healed.

Moderately Recommended (B)
High-risk scaphoid fractures should be promptly referred to specialists for definitive treatment (higher risk of nonunion, malunion, or degenerative joint disease).

Scaphoid Fracture: Casting

Thumb concurrently with wrist immobilization. Unclear, data conflict (Clay 91; Gellman 89; Schramm 80) and debatable. Some data suggest no improvement in healing or reduced nonunion, others believe improved results. Thumb immobilization markedly impairs function (Clay 91; London 61; Bohler 54; Cohen 01, Brooks 05).

- No Recommendation, Insufficient (I)

Scaphoid Fracture: Casting

Scaphoid tubercle fracture: Wrist splinting as heal well. (no quality studies)
- Recommended, Insufficient (I)
Occult/suspected fractures (x-ray neg.): Colles’ casting or supportive bandaging for 2 weeks, then cast removal, re-x-ray. Prognosis very good as fragments by definition, well approximated. If x-rays again negative and symptoms persist, unlikely fracture and consider other diagnoses.
- Recommended, Insufficient (I)
### Scaphoid Fracture: Casting

High-risk fractures displaced 1mm or more, proximal 1/3 or oblique: Long-arm casting at 90° of elbow flexion. Recommended these be evaluated and treated by specialist experienced in managing these fractures. Many of these are treated surgically (no quality studies).

- **Recommended, Insufficient (I)**

  [www.healio.com](http://www.healio.com)

### Scaphoid Fracture: Surgery

Displaced scaphoid fractures: surgical fixation.

- **Recommended, Insufficient (I)**

  Nondisplaced or minimally displaced scaphoid fractures for patients requiring earlier functional recovery (athletes, some workers), including those not wishing attempt at non-operative treatment. Risk is higher osteoarthrosis rate vs. earlier recovery.

- **Recommended (C)**

  Non-displaced or minimally displaced scaphoid fracture fixation for all other patients.

- **Not Recommended**

- **(C)**

  AAOS:

### Distal Phalangeal Fractures
X-rays to diagnose tuft fractures.
- **Indication** – Clinical tuft fractures not involving DIP joint do not require x-rays as do not alter treatment. Threshold for obtaining x-rays is low to document not involving joint.
- **Frequency/Duration** – Follow-up x-rays rarely indicated aside from complicated healing.
- **Recommended, Insufficient (I)**

Case courtesy of Dr Jeremy Jones, Radiopaedia.org, rID: 6429

Wound management

- Trephination for management of subungual hematoma.
  - **Recommended, Insufficient (I)**

  - Nail removal and laceration repair for management of subungual hematoma.
  - **Not Recommended, Insufficient (I)**

Antibiotics and Tetanus

- Post-trephination antibiotic prophylaxis for open fractures. (No evidence needed.)
  - **No Recommendation, Insufficient (I)**

  - Update tetanus.
  - **Recommended, Insufficient (I)**
Splinting and Surgery

Splinting to the PIP for 3 weeks (usually aluminum/foam). (Hardy 04, Lee 00, Bowman 93)
Recommended, Insufficient (I)
Tight circumferential fingertip taping.
● Not Recommended, (I)

Surgery Rarely needed, except extremely displaced, unable to be reduced or are unstable. (K-wire)

Triangular Fibrocartilage Tears

www.houstonmethodist.org:

TFCC Tears

Background: High prevalence (~40% in asymptomatics) likely many asymptomatic (Bednar 91, 94; Haims 02)
History: Mixture degenerative and traumatic. Ulnar wrist pain. Wrist catching, snapping or popping with movement.
Physical Exam: Exam should reproduce symptoms.
Imaging: Should be consistent with tear of sufficient magnitude to explain symptoms.
**TFCC Imaging**

X-rays to diagnose triangular fibrocartilage complex (TFCC) tears. No quality studies. May help rule out other causes of pain. Help identify positive ulna variance.

- **Recommended, Insufficient (I)**
  
  MR arthrography or MRI recommended to diagnose. MR arthrography thought superior.

- **Recommended, Insufficient (I)**
  
  Virtual MR arthroscopy is in development, but its utility is not yet demonstrated. (Sahin 04)

---

**TFCC: Initial Care**

Rest for acute, subacute, or chronic tears.

- **Recommended (I)**
  
  Splinting for mod. or severe acute and subacute tears, particularly reduce forearm rotation.

- **Recommended (I)**
  
  Self-application of ice or heat.

- **Recommended (I)**
  
  NSAIDs: Recommended (I)
**TFCC Tears: Surgery**

TFCC tear location thought related to prognosis. Peripheral tears with better success with non-operative treatment due to vascular supply. Central tears also may become asymptomatic. (Palmer 90)

Arthroscopic repair most typically used with excellent or good results in 74% of case series of 35 (Estrella 07) with other estimates success up to 93%.

http://orthodoc.aaos.org/DrDidierFontes/POI
GNET-%20-%20TFCC-%20Classification.pdf

---

**TFCC Tears: Surgery**

Surgical repair (arthroscopic or open) recommended if instability, concomitant fractures, or symptoms persisting without trend towards resolution despite non-operative treatment and about 3 to 6 weeks.

- **Recommended, Insufficient (I)**

No quality studies of TFCC surgical repair, although open repairs may be performed.

- **Recommended, Insufficient (I)**

Ulna shortening (Minami 98) and wafer procedures recommended for select cases with unsuccessful treatment and ulna positive variance.

---

**Mallet Finger**

Case courtesy of Dr. Salem Bauones, Radiopaedia.org, rID: 26252

AAOS: http://orthoinfo.aaos.org/topic.cfm?topic=a00018
Mallet Finger: Imaging

X-rays recommended in most cases of mallet finger to determine if fracture present and to what extent. Reasonable to omit x-rays if there is no swelling or tenderness.

- Recommended, Insufficient (I)

Ultrasound for mallet finger

- Not Recommended (I)

Case courtesy of Dr. Hani Al Salam, Radiopaedia.org, rID: 12227

Mallet Finger: Splinting

Extension splinting with joint in neutral or hyperextended position for acute or subacute mallet finger. (3 mod quality RCTs. No quality evidence one splint superior. Padded aluminum superior to Styka splint due to fewer skin complications, Matsu 93. One study suggests better outcome with fixation for patients with delayed treatment, Auchincloss 82)

- Frequency/Duration – 6 to 8 weeks, possible nocturnal use for additional 2 to 4 weeks

- Moderately Recommended (B)

Careful instructions on splint wear. Recommended (I)

AAOS

Mallet Finger: Surgery

Surgical treatment with fixation wire for displaced fractures with more than one third to one half of articular surface of DIP joint.

- Recommended, Insufficient (I)

Surgery is for those that fail splinting yet have sufficient symptoms or concerns that attempt at fixation desired.

- Recommended, Insufficient (I)
**Non-specific Hand, Wrist Forearm Pain**

**NS Pain: Diagnostics**

Rheumatological studies particularly for patients with persistent, unexplained arthralgias or tenosynovitis. Repeat studies may be required after passage of time as some develop positive antibodies after months to years.

- **Recommended, Insufficient (I)**
- Arthrocentesis for inexplicable joint effusions, particularly for evaluation of infections and crystalline arthropathies.
- **Recommended, Insufficient (I)**

**Non-Specific HWF Pain: Eval.**

- X-rays for persistent non-specific hand, wrist, or forearm pain.
- **Recommended, Insufficient (I)**
- Electrodiagnostic studies for paresthesias or other neurological symptoms, especially characteristic of radiculopathies and entrapment neuropathies. **Caution regarding high prevalence of abnormal electrodiagnostic studies in asymptomatic populations.** Should generally be performed not sooner than 3 weeks after symptom onset.
- **Recommended, Insufficient (I)**
NS HWF Pain: Initial Care

Relative rest for select cases of acute non-specific HWF pain, particularly where high ergonomic exposures (high force, or high force combined with other risk factors):

- **Recommended, Insufficient (I)**
  Splinting for acute or subacute NS HWF pain. Caution that enforces debility.

- **No Recommendation, (I)**
  Self-application of ice or heat for acute or subacute non-specific HWF pain.

- **Recommended, Insufficient (I)**

Non-specific HWF: Meds

NSAIDs (2 mod-quality RCTs) and acetaminophen for acute or subacute non-specific HWF pain.

- **Recommended (C) – NSAIDs.**
  - (I) - Acetaminophen, Aspirin

  Opioids not recommended for acute, subacute or chronic non-specific hand, wrist, or forearm pain.

- **Not Recommended, Insufficient (I)**

Non-specific HWF: Ex, PT, OT

Physical or occupational therapy for acute, subacute or chronic non-specific HWF pain. Generally not indicated initially. Trials may be more reasonable for persistence. Treatment is empiric and thus success may be limited.

- **No Recommendation (I)**
  Exercise not generally indicated acutely. Many with chronic findings, functional deficits and post-operative require some appointments to at minimum help institute a home exercise program.
Animal and Human Bites

Culture and Sensitivity
- Routine Culture and Sensitivity
- Unhelpful at baseline (Skurka 86)
- Moderately
- Not Recommended (B)

Antibiotics Prophylaxis
- Dogs: penicillin VK, cloxacillin, dicloxacillin, erythromycin, co-trimoxazole, cephalaxin, and amoxicillin/clavulanate. Strong Gram positive coverage required
  - Recommended (C)
- Humans: broad spectrum
  - Recommended (C)
- Cats: Strong Gram positive coverage
  - Recommended (I)
Thank You!!