Shoulder Disorders:
ICF-based Clinical Practice Guidelines

Philip McClure, PT, PhD
Martin J. Kelley, DPT
Lori A. Michener, PT, PhD
Joe Godges, DPT

Aims of the Guidelines
Orthopaedic Section, APTA, Inc

Describe diagnostic classifications based upon ICF terminology
Describe best outcome measures to use
Describe best intervention strategies that are matched to the classification

in other words:
- reduce unwarranted variation
- do the right thing at the right time for the right patient

Aims of the Guidelines
Orthopaedic Section, APTA, Inc

- an associated benefit -

Strategic Outcome 1 – Standards of Practice:

Objective B – Develop National Orthopaedic Physical Therapy Outcomes Database

Orthopaedic Section
pilot study – 2012 & 2013

Clinical Practice Guidelines enable a seamless creation of "minimal data sets" – a critical foundation of outcome databases

Minimal Data Set Needs

1. Neck Pain
2. Shoulder Disorders
3. Low Back Pain
4. Knee Disorders

served by process & rigor of clinical guideline development

Published Clinical Practice Guidelines:

7. Low Back Pain (2012)
### Published Clinical Practice Guidelines:

7. Low Back Pain (2012)

### Shoulder Pain & Mobility Deficits/
Adhesive Capsulitis (May 2013)
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- **Michael A. Shaffer** MSPT
- **John E. Kuhn** MD
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### Published Clinical Practice Guidelines:

- [jospt.org](http://jospt.org) Open access
- [orthopt.org](http://orthopt.org)
- [guidelines.gov](http://guidelines.gov) AHQR National Guidelines Clearinghouse

### Published Clinical Practice Guidelines:

7. Low Back Pain (2012)
9. Ankle Sprains (Sept. 2013)
ICF Guidelines Current Status

Guidelines – in Review:

10. Non-arthritic Hip Joint Pain

Look for publication later this spring

Guidelines – under construction:

11. Patellofemoral Pain Syndrome

12. Carpal Tunnel Syndrome
   (collaborating with the Hand Rehabilitation Section)

13. Distal Radius Fractures
   (collaborating with the Hand Rehabilitation Section)

Future Clinical Practice Guidelines:

17. Subacromial Pain Syndrome

18. Shoulder Instability

19 + . Potential Collaboration(s) with the Sports PT Section

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Feedback / Comments Very Welcomed!
Classification of Shoulder Disorders: A Staged Algorithm for Rehabilitation

Phil McClure PT, PhD, FAPTA
Arcadia University

The Shoulder and ICF

<table>
<thead>
<tr>
<th>Impairments</th>
<th>Popular Label</th>
<th>ICD 9</th>
<th>ICF-body Structure</th>
<th>Activities/ Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotator Cuff Tendinopathy (Impingement)</td>
<td>726.1 Rot Cuff Syndrome</td>
<td>B7300</td>
<td>Muscle of shoulder region</td>
<td>D4452 Building, D4304 Lifting, D650 Work, D520 Caring for body parts, D4451 Pushing, D4452 Building, D350 Throwing</td>
</tr>
<tr>
<td>Frozen Shoulder</td>
<td>726.0 Adhesive Capsulitis</td>
<td>B7200</td>
<td>Mobility of a single joint</td>
<td>D250 Joints of shoulder region, D4451 Pulling, D4452 Building, D350 Throwing</td>
</tr>
<tr>
<td>Glenohumeral Instability</td>
<td>840.2 Shoulder ligament sprain</td>
<td>B7201</td>
<td>Ligaments and fasciae of shoulder region</td>
<td>D4451 Pulling, D4452 Building, D350 Throwing</td>
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</tr>
</tbody>
</table>

Why Classify?

- Direct Intervention
- Prognosis
- Communication
  - Research
  - Payors
- Other?

Shoulder Dx /Classification

Pathoanatomic Classification
- Rotator Cuff “Syndrome” / Impingement
- Glenohumeral Instability
- Adhesive Capsulitis
- Others

Assumptions within a Pathoanatomic Model
- Tissue pathology represents an homogenous group
  - i.e. they look similar and should be treated similar
- Strong relationship between tissue pathology and patient complaints
  - i.e. must “fix” pathologic anatomy for pain and function to improve

Acknowledgements:

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Mike Griffith PT, DPT, ATC
Karen Hase PT, DPT, OCS
Tania Jaff PT, PhD, ATC

Three-level Staged Algorithm for Rehabilitation classification for shoulder pain
**Does the Pathoanatomic Dx Matter?**

Impairment: Limited GH mobility: Capsular

- 30 yo Post Fx Stiffness
- 50 yo Adhesive Capsulitis
- 70 yo GH Arthritis

**Prognosis**

**Natural History**

**Rehab Strategy**

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**Key Decisions:**

- PT and/or Referral?

**Specific Tissue Disorder?**

- Rehab vs Surgery
- Key tissue and movement precautions
- Prognosis and Patient Education

**What Physical Stress Intensity?**

- Minimal
- Moderate
- High

**What are the Key Impairments driving symptoms or functional loss?**

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**Discussion**

Comparison of Pathoanatomic Dx and Rehab Classification

- **Pathoanatomic Dx**
  - Primary Tissue Pathology
  - Stable over episode of care
  - Guides general Rx strategy
  - Informs prognosis
  - Surgical Decisions

- **Rehab Classification**
  - Irritability / Impairment
  - Often changes over episode of care
  - Guides specific rehab Rx
    - Physical stress dosage
    - Specific Impairments
  - May inform prognosis?

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**Discussion:**

A Staged Algorithm for Rehabilitation

**Limitations (at least a few)**

- Conceptual Stage
- Does “irritability” capture key features determining application of physical stress?
- Does not address “non-physical” issues
- Reliability
- Validity

**Potential Features**

- Relatively simple
- Captures thought process of many seasoned clinicians
- Possible broad application
- Not “separate” from medical framework

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Adhesive Capsulitis: Clinical Practice Guidelines
Martin J. Kelley, DPT, Michael A. Shaffer, MSPT, John E. Kuhn, MD, Lori A. Michener, PT, PhD, Arnee L. Seitz, PT, PhD, Timothy L. Uhl, PT, PhD, Joseph J. Godges, DPT, MA, Philip W. McClure, PT, PhD

CLINICAL PRACTICE GUIDELINES

Shoulder Pain and Mobility Deficits: Adhesive Capsulitis
Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability, and Health From the Orthopaedic Section of the American Physical Therapy Association.

Adhesive Capsulitis
• An entity of unknown etiology resulting in painful and limited active and passive shoulder motion, however, it demonstrates a characteristic history, presentation and recovery

This is not Adhesive Capsulitis

ETIOLOGY
• Auto-immune response
• Biceps tenosynovitis
• Trigger points-subscapularis
• Autonomic reflex dysfunction
• Relationship to increased cytokines levels
  – Hutchinson et al. 1998 reported on 12 patients with gastric cancer who were treated with synthetic matrix metalloproteinase
  – Six developed frozen shoulder

Etiology
• Cytokines
  – Involved in the initiation and termination of tissue repair
  – May be involved in the inflammatory and fibrotic process relate to adhesive capsulitis
  – Sustained production can result in fibrosis
  – Imbalance between aggressive healing, scarring, contracture and a failure of remodeling may lead to protracted stiffening of the capsule

Purpose
• Describe evidence-based physical therapy practice for adhesive capsulitis
• Classify and define adhesive capsulitis using the World Health Organization’s terminology
• Identify interventions supported by current best evidence
• Identify appropriate outcome measures to assess changes resulting from physical therapy interventions
• Provide a description to policy makers, payers and claims reviewers regarding the practice of orthopaedic physical therapy
• Create a reference publication for orthopaedic physical therapy clinicians, academic instructors and students
Method

- The American Physical Therapy Association (APTA) Orthopaedic section appointed content experts
- The content experts identified impairments of body function and structure, activity limitations, and participation restrictions using ICF terminology to:
  - (1) Categorize patients into mutually exclusive impairment patterns to base intervention strategies
  - (2) Serve as measures of changes in function over the course of an episode of care.
- The content experts described interventions and supporting evidence.

» Performed a systematic search of MEDLINE, CINAHL, and the Cochrane Database of Systematic Reviews (1966 through September 2011) for any relevant articles
- These guidelines were issued in 2013, based on publications in the scientific literature prior to September 2011
- These guidelines will be considered for review in 2017, or sooner if new evidence becomes available.

Levels of Evidence

I
- Evidence obtained from high-quality diagnostic studies, prospective studies, or randomized controlled trials

II
- Evidence obtained from lesser-quality diagnostic studies, prospective studies, or randomized controlled trials (e.g., weaker diagnostic criteria and reference standards, improper randomization, no blinding, less than 80% follow-up)

III
- Case-controlled studies or retrospective studies

IV
- Case series

V
- Expert opinion

Grades of Evidence

<table>
<thead>
<tr>
<th>GRADES OF RECOMMENDATION BASED ON STRENGTH OF EVIDENCE</th>
</tr>
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<tbody>
<tr>
<td>A</td>
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<tr>
<td></td>
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</tbody>
</table>

Adhesive Capsulitis-Frozen Shoulder Classification

<table>
<thead>
<tr>
<th>PRIMARY (Idiopathic)</th>
<th>SECONDARY (Known Disorders)</th>
<th>POST SURGERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTEMIC IDDM</td>
<td>CVA</td>
<td>RC Tendon</td>
</tr>
<tr>
<td>Hypo/ hyperthyroidism</td>
<td>MI</td>
<td>Biceps tendon</td>
</tr>
<tr>
<td>Cervical DD Immobility</td>
<td>FX</td>
<td>Calcific tendon</td>
</tr>
<tr>
<td>FX</td>
<td></td>
<td>AC arthritis</td>
</tr>
</tbody>
</table>

Natural History

Reeves, 1975
Neviaser, 2010
Synovitis/Angiogenesis

Fibroplasia

Examination

• Hallmark finding is the loss of passive external rotation with the arm at the side

Intervention-based Classification

<table>
<thead>
<tr>
<th>Modalities</th>
<th>High Irritability</th>
<th>Moderate Irritability</th>
<th>Low Irritability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modalities</td>
<td>Heat/corticosteroid injection</td>
<td>Heat/corticosteroid injection</td>
<td>--</td>
</tr>
<tr>
<td>Activity Modification</td>
<td>yes</td>
<td>yes</td>
<td>--</td>
</tr>
<tr>
<td>ROM Stretch</td>
<td>Short duration (≥ 15 min)</td>
<td>Short duration (≥ 15 min)</td>
<td>--</td>
</tr>
<tr>
<td>Modalities</td>
<td>Heat/ice/electrical stimulation</td>
<td>Heat/ice/electrical stimulation</td>
<td>--</td>
</tr>
<tr>
<td>Modalities</td>
<td>Activity Modification</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Modalities</td>
<td>ROM/Stretch</td>
<td>Short duration (1-5 secs)</td>
<td>Pain-free passive AAROM</td>
</tr>
<tr>
<td>Modalities</td>
<td>Therapy Techniques</td>
<td>--</td>
<td>Low grade mobilization</td>
</tr>
<tr>
<td>Modalities</td>
<td>Functional Activities</td>
<td>--</td>
<td>High grade mobilization</td>
</tr>
<tr>
<td>Modalities</td>
<td>Strengthen</td>
<td>--</td>
<td>Light resistance</td>
</tr>
</tbody>
</table>

Intervention Recommendations

A Strong evidence
Intra-articular corticosteroid injections combined with shoulder mobility and stretching exercises are more effective in providing short-term (4-6 weeks) pain relief and improved function compared to shoulder mobility and stretching exercises alone

Intra-articular Corticosteroids, Supervised Physiotherapy, or a Combination of the Two in the Treatment of Adhesive Capsulitis of the Shoulder

• Prospective and randomized
• 93 patients
• Criteria
  - ≥ 25% loss in at least 2 directions (FF, Abd, ER, IR)
  - SPADI total score ≥ 30
Four groups
• GH joint steroid injection under fluoroscopy
• GH joint steroid injection under fluoroscopy and supervised PT (12 one hour sessions X 4 weeks)
• Saline injection and PT
• Saline injection alone

Results

• At 6 weeks
  – injection/PT SPADI highest
  – ROM increased in all groups but injection/PT group had greatest increase
• At 6 months SPADI scores were not different but AROM and PROM were better in injection/PT group.
• No difference at 12 months
• PT no better than placebo
Intervention Recommendations

**MODALITIES**

- **Weak evidence**
  Clinicians may utilize shortwave diathermy, ultrasound, or electrical stimulation combined with mobility and stretching exercises to reduce pain and improve shoulder ROM in patients with adhesive capsulitis.

  - Cheing, 2008
  - Dogra, 2008
  - Leung, 2008
  - Guler-Uysal, 2004

**PATIENT EDUCATION**

- **Moderate evidence**
  Clinicians should utilize patient education that (1) describes the natural course of the disease, (2) promotes activity modification to encourage functional, pain-free ROM, and (3) matches the intensity of stretching to the patient’s current level of irritability.

  - Diercks, 2004

**JOINT MOBILIZATION**

- **Weak evidence**
  Clinicians may utilize joint mobilization procedures primarily directed to the glenohumeral joint to reduce pain and increase motion and function in patients with adhesive capsulitis.

  - Tanaka, 2010
  - Chen, 2009
  - Johnson, 2007
  - Yang, 2007
  - Vermuellen, 2006
  - Nicholas, 1985
  - Bulgen, 1984

**TRANSLATIONAL MANIPULATION**

- **Weak evidence**
  Clinicians may utilize translational manipulation under anesthesia directed to the glenohumeral joint in patients with adhesive capsulitis who are not responding to conservative interventions.

  - Roudal, 1996
  - Placzek, 1998

**STRETCHING EXERCISES**

- **Moderate evidence**
  Clinicians should instruct patients with adhesive capsulitis in stretching exercises. The intensity of the exercises should be determined by the patient’s tissue irritability level.

  - Celik, 2010
  - Tanaka, 2010
  - Kivimaki, 2007
  - Levine, 2007
  - Diercks, 2004
  - Griggs, 2000
  - Lee, 1974

**Joint Mobilization**

**Effect**-
- Reducing pain and influencing tissue length is what restores motion and normal arthrokinematics.
- Vermullen et al., 2000
  - Intense end range mobilization
- Vermullen et al., 2006
  - High-grade vs. low-grade mobilization
  - The high-grade mobilization group did better but only a minority of comparisons reached statistical significance and the overall differences between the two interventions was small.
Joint Mobilization and Self-Exercise

- N=110
- Investigated the relationship of frequency (supervised PT) to outcome

Patients received joint mobilization at high frequency (>2X a week), moderate frequency (1X a week) and low frequency (< 1X a week)

- All groups performed a HEP of pendulum and wall walks

Results

- No relationship between frequency of treatment and motion gain or time to reach plateau
- Was a significant relationship between frequency of HEP and both motion gained and shorter time to plateau

Adhesive Capsulitis Intervention Algorithm

When To Discharge?

- Improved pain, satisfaction and function
- Minimal irritability- can give overpressure at end range with little or no pain
- 0 – 5-10 degree intra-session change and minimal or no irritability
- Stagnant inter-session change in motion

"Hit the Fibrotic Wall"

Conclusion

- Strong evidence exist for intra-articular injections providing significant short-term relief
- Patients with frozen shoulder can dramatically respond to both a therapist instructed home exercise program and short duration supervised physical therapy
- Using an algorithmic treatment approach helps to determined response to treatment, need for treatment and a pathway for further intervention.
Shoulder Muscle Power and Movement Coordination
Impairments: Rotator Cuff Disease

Lori Michener, PhD, PT, ATC, SCS
Virginia Commonwealth University
Richmond, VA

Rotator Cuff Disease
- Rotator Cuff Disease
  What does this involve?

Rotator Cuff Disease
- Full-thickness RC tear
- Partial thickness RC tear
- Bursitis
- Tendinitis
- Tendinopathy
- Subacromial (‘impingement’) pain syndrome

** Is it better to label this RC Syndrome as we are not sure of the pathology

Rotator Cuff Syndrome
What are the Dx criteria?
- Rotator cuff disease
  - Full-thickness RC tear
- Partial thickness RC tear
- Bursitis
- Tendinitis
- Tendinopathy
- Subacromial (‘impingement’) syndrome

All likely present with similar symptoms -- pain in the Subacromial Space

Subacromial Pain Syndrome

Rotator Cuff Syndrome
- Adhesive Capsulitis
- Glenohumeral Instability
- Other

Pathoanatomic Diagnoses
- Key positive findings
  - Impingement signs
  - Painful arc
  - Pain w/ isom resist
  - Weakness
  - Atrophy
- Key negative findings
  - Sig loss of motion
  - Instability signs

Pathoanatomic Dx based on specific physical exam (+/- imaging).
Special Tests – RC Disease

- Painful arc
- Hawkin’s test
- Neer’s Test
- Speed’s test
- Yergason’s Test
- ER Resistance Test
- IR Resistance Test
- Full Can Test
- Empty Can / Jobe
- Drop Arm
- ER lag
- Belly Press / Lift Off
- More.. Combination of tests

Dx RCD - Lots of Syst Reviews


**Confirm RCD** (R/In) – single tests
1. Painful arc
2. Resisted ER (ERRT) – pain or weakness
3. Full Can
4. Drop Arm

**Screen Out RCD** (R/Out) – single tests
1. Painful arc
2. Hawkins
3. Neer
4. Resisted ER (ERRT) – pain or weakness
5. Empty Can
6. Full Can

Combination of Tests: RCD

- **Test Combo** (Michener LA, Archives PM&R, 2009)
  - ≥ 3+/5: Painful arc, Neer, R/In +LR: 2.93
  - < 3+ / 5 (as above) R/Out -LR: 0.34

- **Test Combo** (Park HB, JBJS, 2005)
  - 3+: Hawkins, painful arc, ERRT R/In +LR: 10.6
  - 3-: Hawkins, painful arc, ERRT R/Out -LR: 0.17

Pathoanatomic Diagnoses

- **Key positive findings**
  - Impingement signs
  - Painful arc
  - Pain w/ isom resist
  - Weakness – abd / ER
  - Atrophy

- **Key negative findings**
  - Sig loss of motion
  - Instability signs

Dx FT-RCT - Lots of Syst Reviews


**Confirm FT-RCT only** (R/In) – single tests
1. Painful arc
2. Resisted ER – pain or weakness
3. ER lag test – supraspinatus infraspinatus
4. IR lag & Lift off subscapularis
5. Drop arm
6. Atrophy of infrasp.
7. Belly off

**Screen Out FT-RCT** (R/Out) – single tests
1. IR lag & Lift-off subscapularis
2. Resisted ER (ERRT) – pain or weakness
3. Empty Can
4. Full Can

**Combination of Tests: FT-RCT**

- **Test Combo** (Park HB, et al; JBJS, 2005)
  - 3 Tests: Drop arm, Painful arc, ERRT
  - All 3 tests + R/In +LR: 15.57
  - All 3 tests - R/Out -LR: 0.16

  - >65yo, ER weak, night pain
  - All 3 +: R/In +LR: 9.84
  - All 3 -: R/Out -LR: 0.54
Complaint of “Shoulder Symptom”

Level 1
Screen
History, Basic Phys Exam, Red/Yellow Flags

Non-shoulder origin of sx
Shoulder origin of sx

Level 2
Medical Dx
Specific Physical Exam

Rotator Cuff Syndrome
Frozen Shoulder
Glenohumeral Instability
Other

Level 3
Rehab Dx
High Irritability & Impairments
Moderate Irritability & Impairments
Low Irritability & Impairments

Systematic Reviews of SA pain

- 9-16 RCTs
- ↓ pain & ↑ function / disability:
  - Exercise- stretch & strengthen/ MC
  - Exercise + manual therapy to the glenohumeral joint and/or spine
  - Home exercise programs
  - Passive treatments: not recommended
  - US: not effective

RCD Management

- Treatment approach
  1. Strengthen /Motor Control – Rotator cuff, scapular, shoulder
     *Motor control alone – unclear of effectiveness*
  2. Flexibility – post cuff, pec minor, lats, CT spine
  3. Scapular Dysf – Scap taping + Motor Control, addition of scapular stabilization exercises
  4. Home exercise program + supervised or just HEP if appropriate

Evidence – Manual Therapy (MT)

- Spine & GH MT + ex vs exercise alone
  - Addition of MT improved function
    (Bang M, 2000; Bennell, 2010; Winters, 1999)
  - GH mobs alone or added to ex vs. ex
    - No diff in outcomes (Yasemides R, 2011; Kachingwe A, 2008)
    - Better outcomes, but small trials & effect sizes
      (Senbursa, 2011; Senbursa, 2007; Conroy, 1998)
  - Is spinal MT the active ingredient?
    - RCT – improved outcomes with thoracic manipulation/ mobs
      (Bergman, 2004; Winters J, 1999)

- 5. Modalities – limited use, only in combination with active treatment
    - Pain, ↑ joint motion, other neurophysiological effects, ?? biomechanical at spine??
    - GH – alone - doesn’t appear effective

- 7. Use of impairments
  - Guiding Treatment
    - Hi – Moderate – Lo irritability
    - Dose: Hi reps (dose)
Dose - Evidence

- Hi-dose: ↑ pain & function 3, 6 & 12 months post
- High-dose:
  - 1-hr session, 9-11 exercises, 3 x 30 reps, 1000 reps per treatment, aerobic ex
- Low -dose: 2 x 10 reps/ exercise

Treatment Approach – no evidence

- Unsure (limited or no evidence):
  - Scapular taping – immediate effects only
  - Scapular motor control and stabilization exercise focus
  - Core stability training
  - Eccentrics focus
  - Frequency of treatment
  - Progression of treatment
  - Dose of exercise and manual therapy

Questions?

"THE DOCTOR, MY EM PSYCHIAN?
MY ORGAN IS FUEL."