
Combined Sections Meeting – New Orleans, LA. February 22, 2018
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Objectives

• Apply an impairment based evaluation of the Upper Extremity.
• Identify selected OMPT techniques used in the management of subacromial pain syndrome, adhesive capsulitis and SICK scapula.
• Develop a differential diagnosis for conditions in the cervical, thoracic, shoulder, elbow, wrist, and hand to identify conditions where manual therapy intervention will be most effective.
• Understand recent literature surrounding OMPT for upper extremity conditions.

Disclosures

• Derek Vraa, PT, DPT - The views expressed herein are those of the individual & do not reflect those of the United States Air Force or the Department of Defense
• Wil Kolb, PT, DPT - None
• Matthew Vraa, PT, DPT, MBA - I am unfortunately related to one of the other speakers on this panel.
• Michael Gans, PT, DPT - None
• Mary Beth Geiser, PT, DPT - None
• Dustin McGann, PT, DPT - None
• Jeevan Pandy, PT, DPT - None
• Eric Wilson, PT, DPT, DSc - The views expressed herein are those of the individual & do not reflect those of the United States Air Force or the Department of Defense:

Regional Interdependence & Upper Extremity Manual Therapy

What is Regional Interdependence (RI)?

• “Dysfunction in any unit of the system will cause delivery of abnormal stresses to other segments of the system with the development of a subsequent dysfunction here as well” – Erhard & Bowling 1977
• “...seemingly unrelated impairments in a remote anatomical region may contribute to, or be associated with, the patient’s primary complaint.” Wainner et al. 2007

Why Regional Interdependence?

• Pain referral patterns vary
• Literature support
• Clinical support
• Pathoanatomical & biomedical models don’t explain all pain
• Lack of improvement with current localized treatment
How Does Manual Therapy Work?

The Case for Regional Interdependence

Regional Interdependence Lateral Elbow Pain (LEP)

Regional Impairments Associated with LEP

- Prospective Cohort of 83 LE patients
- Multimodal care at 11 different sites
- 57% had cervical impairments
- 31 patients with lateral elbow pain (LEP) & 31 asymptomatic controls (C)
- 70% of LEP reported pain in the cervical / thoracic regions vs 16% in asymptomatic group
- 58% of LEP reported lateral elbow pain during radial nerve testing vs 13% in asymptomatic group
- Significantly less ROM was noted in cervical FLX/EXT in LEP (P<.01)

Elbow Pain/PPT

- Vicenzino. Pain. 1996
- Struijs. Phys Ther. 2003
- Cleland. J Man Manip Ther. 2005
Elbow Disability

- Cleland. *J Man Manip Ther.* 2005
- Abbott JH. *Man Ther.* 2001

Pain Free Grip Strength

- Cleland. *J Man Manip Ther.* 2005

Health Care Resources


Regional Interdependence & Hand Pain

  - Case control blinded study
  - 71 females, age 35-59
  - Diagnosed with Carpal Tunnel Syndrome (CTS) via EMG examined for ROM restrictions
  - Regardless of severity, females with CTS exhibited loss of cervical ROM

Regional Interdependence & Shoulder Pain
### Decreased Pain
- Dunning, J Manipulative Physiol Ther. 2015
- Bergman, Ann Intern Med. 2004
- Strunce, J Man Manip Ther. 2009
- Boyles, Man Ther. 2009
- Bergman, J Man Physiol Ther. 2010
- Kardouni, Man Ther. 2015
- Wassinger, Man Ther. 2016

### Improving Function/Recovery
- Dunning, J Manipulative Physiol Ther. 2015
- Strunce, J Man Manip Ther. 2009
- Boyles, Man Ther. 2009
- Bergman, Ann Intern Med. 2004
- Bergman, J Man Physiol Ther. 2010
- Kardouni. Man Ther. 2015

### Improving Muscular Activity/Strength
- Bang & Deyle, JOSPT, 2000
- Cleland, JMMT, 2004
- Liebler, JMMT, 2001

### Improving Shoulder Mechanics/Range of Motion
- Strunce, J Man Manip Ther. 2009
- Bergman. J Man Physiol Ther. 2010
- Haxby-Abbott. Man Ther. 2001

### Health Care Resources
- Rhon, Ann Intern Med. 2014

### Systematic Reviews
  - There is limited evidence to support the use of TSM for shoulder conditions, but there is enough evidence to encourage the pursuit of additional research to determine if TSM is effective for such treatment
- Aoyagi. Man Ther. 2015
  - There is very low quality evidence that Spinal Manipulation is not better nor inferior than other interventions in the management of upper limb pain
- Peek. J Man Manip Ther. 2015
  - Thoracic manual therapy accelerated recovery and reduced pain and disability immediately and for up to 52 weeks compared with usual care for Non-Specific Shoulder Pain
Regional Interdependence & the Thoracic Spine

References

Orthopedic Manual Therapy OF THE SHOULDER COMPLEX

Is Manual Physical Therapy Effective for the Shoulder?

OMPT for the Shoulder (SIS) SR&MA Results (Steuri 2017 Br J Sports Med)

- “Very low quality evidence... exercise should be considered for pts with SIS symptoms and tape, ECSWT, laser or MT might be added.”
- “MT was superior to doing nothing or sham”
- “MT plus exercise was superior to exercise alone (but only at the shorter follow-ups)”

Overview: OMPT for the Shoulder (SIS)

- “The available evidence supports the use of MT for non-specific shoulder pain and ankle sprains, but NOT for SIS impingement syndrome in adults.”

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Overview: OMPT for the Shoulder (SIS)

• “Low to Moderate Evidence MT for pain that may not be clinically meaningful”
• “…unclear whether MT used alone or added to an exercise program improves function”

Shoulder Evidence Conundrum

Poor DX agreement + High Treatment Variability = Lower Quality Evidence (SR’s & MA’s)

Difficulties with Shoulder Diagnosis

Cyriax Selective Tissue Tension
- DeWinter, Ann Rheum Dis. 1999 (Kappa 0.44)
- Pellecchia, JOSPT. 1996 (Kappa 0.88)

Patho-anatomical Examination
- Hegedus. Physical Therapy In Sport. 2014
- Biderwolf. IJSPT. 2013

Treatment Based Classification
- Carter. Physiotherapy. 2012 (Kappa 0.66)

Flaw in the Review Process for OMPT

Case Study N=1
- Single Case in front of you with a concordant sign
- Test
- Treat
- Re-Test

RCT N = Multiple
- Inclusion Criteria SIS = Poor Agreement of DX sign(s)
- Generalized Treatment
- Lower Effectiveness

SR+MA N = Pooled
- Inclusion Criteria SIS = Less Agreement
- More Generalized
- Exponentially Lower Effectiveness

Hey SIS - Get a NEW Paradigm

Frost et al. J Shd Elbow Sx. 1999
MRI study industrial workers:
- Twenty-two (55%) subjects in the impingement group and 16 (52%) subjects in the control group had a pathologic supraspinatus tendon
- As age increases findings increase

Hey SIS - Get a NEW Paradigm


SIS is a misnomer
- Neer states “95% of SIS is from acromion but this evidence is equivocal”

Reasons?
- Imaging (or even surgery) does not correlate to symptoms
- Testing is based on gold standard of imaging

Result = many undergo surgery on shoulder tissues that may not be the cause of their symptoms
Hey SIS - Get a NEW Paradigm

New Paradigm? TBC for Shoulder?
1. Change the T-Spine posture
2. Change Scapular position
3. Change GHJ position
4. Symptom neuromodulation – manual therapy

OMPT for Shoulder Conditions SUMMAY

- Support of Patho-anatomical classification with the current literature into:
  - Impingement / Tendinopathy
  - Adhesive Capsulitis
- How Effective is Manual Therapy for these conditions?


- N=104. Steroid injection vs. Manual PT group
- 6 visits of impairment based manual PT for CT and shoulder regions

Results:
- Both groups improved with SPADI > 50% maintained through one year
- Steroid vs Manual PT group had more SIS related visits 60% vs 37% including additional steroid injections 38% vs 20%

Manual Therapy Specific for Shoulder Impingement / Tendinopathy

1) GHJ Mobilization with movement (MWM)
2) AC mobilization
3) Scapular mobilization

MWM Shoulder

With belt end range contract-relax

Stabilize scapula and apply posterolateral GH joint glide.
MWM Shoulder

Kachingwe JMMT 2008
- Randomized into 4 Groups:
  - Supervised Exercise
  - Exercise and GHJ mobilization
  - Exercise and GHJ MWM
  - Wait and see
- No statistical significance but MWM better Pain and ROM
- 6 Visits

Tey's Manual Therapy 2008
- MWM vs Sham vs Control
- 1 Visit Only
- Stat Sig Difference ROM and Pain Pressure Threshold

Delgado-Gil 2015 Shoulder MWM vs Sham

- MWM or Sham (No Ex)
- ONLY 4 visits
- RESULTS: Stat Sig improvements in:
  - Pain with Flexion,
  - Pain-Free Shoulder Flexion,
  - Max Shoulder Flexion

MWM w Belt

Scapular Specific Mobilization Evidence (SIS)

- Scapular Retraction Test (Kibler 2006 Am J Sports Med)
- Scapular Assistance Test (Rabin 2006 JOSPT)
- Scapular Reposition Test (Tate 2008 JOSPT)

Scapula Focused Approach

SR of Bury 2016 Manual Therapy
- 4 Studies met criteria
- Benefits in short term 6 weeks are gone by 3 months
- Early changes in pain are not clinically significant
- Scapula position/movement evidence is conflicting

- Struyf 2013
  - Scap Mob+Ex vs GHJ Mob+Ex
  - Sig Diff Function and Pain
- Surenkock 2009
  - Scapular Mobilization Single treatment effective for Tendinopathy, Tenosynovitis and Adhesive Capsulitis
  - Sig Diff with Shd Function, ROM, but NOT Pain

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2 Hands on Scapula: Protraction & Retraction with Upward tilt

1 Hand on scapula, 1 hand Humeral long axis glide: Lateral scapula mobilization
Summary for Shoulder Tendinopathy

More Research clearly needed!
Difficulty with experimental designs:
• Pragmatic studies too different for SR's….BUT this is how we should treat
• How to define and classify tendinopathy?
Reminders:
• Treat the entire patient (RI)

Adhesive Capsulitis – OMPT vs Injection

2014 Conclusions:
• MT & EX not as effective as Steroid Injection
• Unclear Benefit
• Similar To Sham Ultrasound

Kelley JOSPT. 2013
Adhesive Capsulitis
CLINICAL PRACTICE GUIDELINE

Interventions Joint Mobilization
“C” weak evidence

• Vermeulen. Phys Ther. 2006
• Bulgen. Ann Rheum Dis. 1984
• Nicholson. JOSPT. 1985
• Vermeulen. Phys Ther. 2000
• Yang. Phys Ther. 2007
• Tanaka. Clin Rheumatol. 2010
• Johnson. JOSPT. 2007

Adhesive Capsulitis Phases

Painful Freezing Thawing

Pain > Stiff Stiff > Pain

AC Outcomes OMPT - PAIN

<table>
<thead>
<tr>
<th>Author</th>
<th>Journal</th>
<th>Result</th>
<th>Brief</th>
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<td>Guler-Okuyu</td>
<td>JSM Swiss Med Wkly</td>
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<td>Cortic approach</td>
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<tr>
<td>Vermeulen</td>
<td>JSM - PT</td>
<td>=</td>
<td>Maitland - III (Grade III-V) vs Grade I (Grade I) (2006)</td>
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<td>Johnson</td>
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<td>Maitland vs Post Glim - No Glim for ER (2007)</td>
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<td>Kumar</td>
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<td>Zaman</td>
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<td>Park</td>
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<td>Maitland + Ketterman’s &amp; Distension vs Gen PT (2016)</td>
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<td>Paul</td>
<td>JSM - Phys Ther (Am)</td>
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<td>Maitland vs 10 min distraction inferior capsular (2016)</td>
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<td>Espinosa</td>
<td>JSM - Phys Ther (Am)</td>
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<td>Maitland vs Ex vs ER (2017)</td>
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<td>JSM - Phys Ther (Am)</td>
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<td>Maitland vs Ex vs ER (2017)</td>
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Adapted & Updated from Noten 2016 Arch Phys Med Rehab

Comparisons & Therapeutic Validity?

What is PT?
• Hot Pak
• Ultrasound
• TENS
• Diathermy
• Shoulder Pulley

Hooheboom 2012 PloS one
• Patient Eligibility
• Patient Selection
• Irritability?
• Competences and setting
• Who provided the intervention?
• Intervention matched?
• Rationale
• Content
• Intensity monitored
• Adjusted & Personalized
• Adherence
• What is acceptable

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Park 2014 J PT Sci

1. intensive mobilization + steroid injection with capsular distension (IMSD);  
2. Intensive mobilization (IM) = Maitland Mobs, End Range, Kaltenborn and MWM;  
3. Steroid injection with capsular distension (ISD);  
4. General physical therapy only (GPT) = Hot Pak, TENS, Diathermy (no ex listed) ALL Groups? Stretching HEP?

Hydrodistension under Fluoroscopy

The necks have been introduced thin needle under fluoroscopic control and other hydrodistension the tissue has been aspirated to take 10-30 ml saline & contrast, once this has been removed out of the port

Adhesive Capsulitis – OMPT Summary

- More Research Clearly needed with “Wait & See” Controls
- Benefits of OMPT not readily apparent
- Subject Selection: Staging and Irritability
- Combo approach of Steroid, Distention and OMPT appears best

Vermeulen. Phys Ther. 2006

High-Grade Mobilization Better

Significant Findings:
- High Grade 3-4 better slightly
- Grade 1 & 2 also effective

Techniques: Inferior, Ant, Post & Distraction glide
Also Reverse Distraction

AC Outcomes OMPT - ROM

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<thead>
<tr>
<th>Author</th>
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<tr>
<td>Schuiter</td>
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<td>Arava</td>
<td>JOSPT</td>
<td>Mobilization - HI vs Low Gait &amp; HI if GL Post only</td>
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<td>Kumar</td>
<td>ISRN Rehabilitation</td>
<td>Mobs VS Mid Range Mob + EX</td>
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<td>Maitland &amp; Ex vs EX only: AP/PA/Inferior</td>
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<tr>
<td>Biederwolf</td>
<td>J Phys Ther Sci</td>
<td>Anterior Mobs vs Usual PT; Exclude In Irritability</td>
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<td>Noten</td>
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<td>Hi Grade (III)</td>
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<td>More Research Clearly needed with “Wait &amp; See” Controls</td>
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<td>Delgado</td>
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<td>Evaluation in assessing patients with Adhesive Capsulitis</td>
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<td>Tate</td>
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<td>The initial effects of a Mulligan’s mobilization with movement technique on Adhesive Capsulitis</td>
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<td>Noten</td>
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<td>Buchbinder</td>
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<td>Benefits of OMPT not readily apparent</td>
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Clinical Decision Making

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“Good decisions come from experience. Experience comes from making bad decisions.”
- Mark Twain

Your next patient

• Referring Diagnosis: Shoulder pain.
• Orders: Evaluation and treat.

• Your hypothesis?
  • Possible
  • Probabilistic
  • Problematic
• Planned Tests/Measures
• Planned Intervention

Your Last Examination

• How many minutes did it take?
• How many hypotheses did you generate?
• What clinical reasoning processes did you employ?
• Was your knowledge sufficient to interpret what you saw?
• Did you effectively plan the physical examination?
• Did you reflect on your examination after the fact to identify gaps?

Clinical Decision Making

Doody & McAteer. Physiotherapy. 2002

<table>
<thead>
<tr>
<th>Novice</th>
<th>Expert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean number of hypotheses generated*</td>
<td>9.2</td>
</tr>
<tr>
<td>Mean time to generate first hypothesis (seconds)</td>
<td>108 (SD 63.60)</td>
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<tr>
<td>When majority of hypotheses were generated</td>
<td>Physical Exam</td>
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<tr>
<td>Mean time to complete subjective exam*</td>
<td>8.00 (SD 2.80)</td>
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<tr>
<td>Mean time to complete physical exam*</td>
<td>20.00 (SD 7.92)</td>
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<td>Mean treatment time</td>
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<td>Ratio of time on subjective exam versus physical exam</td>
<td>1:1.32</td>
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<td>Errors in clinical reasoning</td>
<td>1:3.56</td>
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<tr>
<td>Completion of clinical reasoning processes</td>
<td>Incomplete</td>
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</table>

* Statistically significant p < 0.05

Clinical Decision Making Differences

Novice
• Closed interviews
• Data evaluation
• Process driven
• Judgment after data
• Current knowledge about tests
• Skills are not automatic
• Routine Evaluation/Treatment
• Reflection on Action

Expert
• Open interviews
• Intuitive data gathering
• Prioritization driven
• Diagnostic/Pattern recognition
• Testing for intervention success
• Ability to multi-task
• Improvisational Performances
• Reflection in/for Action

Clinical Decision Making Differences

• Doody & McAteer. Physiotherapy. 2002
• May et al. Aust J Physioter. 2008
• Frew et al. Hong Kong J Occ Ther. 2008
• Wainwright et al. Phys Ther. 2010
• Elvén et al. Physiother Theory Pract. 2015
Other Professionals

Novice
- Less accurate initial hypotheses
- Less ability to gather evidence for competing diagnosis
- Often use negative evidence or questions when hypothesis is unclear
- Segmented information from competing diagnosis

Residents
- Lower proportion of negative question (r/o)

Physicians
- More accurate initial hypotheses
- Use more predictive or positive questions to refine diagnosis

Clinical Reasoning:
A Developmental Process

Deductive Reasoning
- Hypothesis Theoretical
- Deductive Reasoning
- Inductive Reasoning

Inductive Reasoning
- Pattern Recognition

Good Clinical Decision Making
• Where do you start?

Experience
Knowledge / Understanding

How to build your clinical decision making
• 1) Build your Hypotheses Generation Ability
  • HOAC II Tool
  • SCRIPT Tool
  • Forward Thinking
  • Pattern Recognition

Hypothesis-Algorithm for Clinicians
Systematic Clinical Reasoning in Physical Therapy (SCRIPT)
Baker et al. Phys Ther. 2017

Forward Thinking

- Taking your hypothesis to the next level.
- If this... then...
- Not just thinking down the line, but also the reasoning why it would occur or could occur.

Pattern recognition

- Reasoning that takes specific information and makes a broader generalization that it considered probable
- More precise problem representation
- Problem representation - the disease
- Recognition that all elements are present
- Skills - ability to process and develop problem representation; knowledge of disease scripts

Things that affect your pattern recognition

- Knowledge and Experience about/with
- Condition and mimicking conditions
- Condition frequency in population and clinic
- Condition Mechanism of Injury
- Cases where you were
  - Correct
  - Incorrect
  - Reflection on it.

Future Thinking and Pattern Recognition Problems

- Confirmation Bias: Only running test that rule in your hypothesis
  - Just because you think it is a certain condition, you need to be diligent to check other hypothesis.
  - Asking Open Ended Questions that provide you answers vs Closed Ended ones that bias your thinking
  - Need to use Sensitive Tests to rule out.
  - Need to use Specific Tests to rule in.
- Attempting to link all findings to one condition.
  - Occam's razor
- Multiple diseases/conditions can have similar presentations
  - Understand different features/presentations
  - Understand similar features/presentations
How to build your clinical decision making

1) Build your Hypotheses Generation Ability
   - HOAC II Tool
   - SCRIPT Tool
   - Forward Thinking
   - Pattern Recognition

2) Evidence Based Practice
   - Clinician Experience
   - Best Research

Evidence Based Practice


What happens when we don’t have high level evidence to support what we are doing or our clinical decision making?

Transitive Relationships
- A is to B. B is to C. Therefore A is to C.

Intersection Relationship
- A intersects with B.
- B intersects with C.
- C intersects with A.
- Therefore A, B, and C intersect.

The customer is always right. Right?

- May not always be right, but patient values/expectations can affect outcomes and need to be considered in patient selection for interventions.
Clinical Reasoning

Take Home

- Reflect on action, in action and for action.
- Use best evidence when possible.
  - Use lower when you don't have "top of the mountain" evidence.
  - When your patient doesn't match study criteria, look for the strongest predictors.
  - Lack of Evidence is different than Evidence of Lack
- Pattern recognition and clinician experience is a part of EBM.
- Reflect upon the individual patient in front on you (n=1)
- Test, Trust, Re-test
- If you try something and it works, it is therapy. If it doesn't work, then it is evaluation.
- You can find out, what it is, by what it isn't

References


Shoulder Case