

Taking the Gloves Off - Evidence Informed Manual Therapy For Upper Extremity Conditions: Part I

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.

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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 Pandya, 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

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Regional Interdependence & Upper Extremity Manual Therapy

Tactical Sports

OMPT



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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

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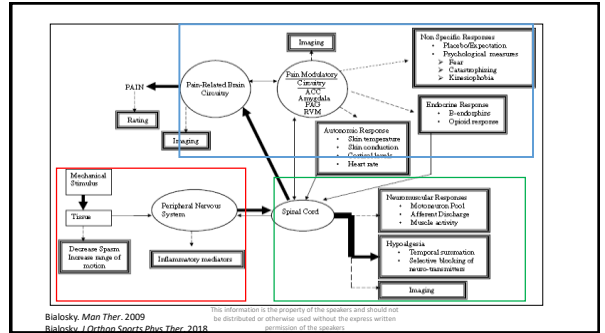
Why Regional Interdependence?

- Pain referral patterns vary
- Literature support
- Clinical support
- Pathoanatomical & biomedical models don’t explain all pain
- Lack of improvement with current localized treatment

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How Does Manual Therapy Work?

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The Case for Regional Interdependence

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Regional Interdependence Lateral Elbow Pain (LEP)

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Regional Impairments Associated with LEP

- Waugh. *Arch Phys Med Rehabil.* 2004
 - Prospective Cohort of 83 LE patients
 - Multimodal care at 11 different sites
 - 57% had cervical impairments
- Berglund. *Manual Therapy.* 2008
 - 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)

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Elbow Pain/PPT

- Vicenzino. *Pain.* 1996
- Struijs. *Phys Ther.* 2003
- Cleland. *J Man Manip Ther.* 2005
- Fernández-Carnero. *J Man Physiol Ther.* 2008

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Elbow Disability

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

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Pain Free Grip Strength

- Vicenzino. *Pain.* 1996
- Cleland. *J Man Manip Ther.* 2005
- Fernández-Carnero. *J Man Physiol Ther.* 2008

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Health Care Resources

- Cleland. *J Orthop Sports Phys Ther.* 2004

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Regional Interdependence & Hand Pain

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- De-La-Llave-Rincon. *J Ortho Sports Phys Ther.* 2011
 - 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

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Regional Interdependence & Shoulder Pain

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Decreased Pain

- Bang & Deyle. *J Orthop Sports Phys Ther.* 2000
- 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

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Improving Function/Recovery

- Bang & Deyle. *J Orthop Sports Phys Ther.* 2000
- 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

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Improving Muscular Activity/Strength

- Bang & Deyle, *JOSPT,* 2000
- Cleland, *JMMT,* 2004
- Liebler, *JMMT,* 2001

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Improving Shoulder Mechanics/Range of Motion

- Strunce. *J Man Manip Ther.* 2009
- Bergman. *J Man Physiol Ther.* 2010
- Haxby-Abbott. *Man Ther.* 2001
- Kardouni. *J Orthop Sports Phys Ther.* 2015
- Muth. *J Orthop Sports Phys Ther.* 2012

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Health Care Resources

- Rhon. *Ann Intern Med.* 2014

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Systematic Reviews

- Walsler. *J Man Manip Ther.* 2009
 - *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*

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Regional Interdependence & the Thoracic Spine

Mintken. *Phys Ther.* 20010
Mintken. *J Orthop Sports Phys Ther.* 2017

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Case Examples

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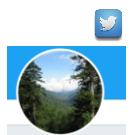
References

- 1. Alvaro B, et al. Cervical dysfunction associated with thoracic spine dysfunction in patients with neck pain. *Spine* 2004;29:1035-1041
- 2. Alvaro B, et al. Cervical dysfunction associated with thoracic spine dysfunction in patients with neck pain. *Spine* 2004;29:1035-1041
- 3. Alvaro B, et al. Cervical dysfunction associated with thoracic spine dysfunction in patients with neck pain. *Spine* 2004;29:1035-1041
- 4. Alvaro B, et al. Cervical dysfunction associated with thoracic spine dysfunction in patients with neck pain. *Spine* 2004;29:1035-1041
- 5. Alvaro B, et al. Cervical dysfunction associated with thoracic spine dysfunction in patients with neck pain. *Spine* 2004;29:1035-1041
- 6. Alvaro B, et al. Cervical dysfunction associated with thoracic spine dysfunction in patients with neck pain. *Spine* 2004;29:1035-1041
- 7. Alvaro B, et al. Cervical dysfunction associated with thoracic spine dysfunction in patients with neck pain. *Spine* 2004;29:1035-1041
- 8. Alvaro B, et al. Cervical dysfunction associated with thoracic spine dysfunction in patients with neck pain. *Spine* 2004;29:1035-1041
- 9. Alvaro B, et al. Cervical dysfunction associated with thoracic spine dysfunction in patients with neck pain. *Spine* 2004;29:1035-1041
- 10. Alvaro B, et al. Cervical dysfunction associated with thoracic spine dysfunction in patients with neck pain. *Spine* 2004;29:1035-1041

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Orthopedic Manual Therapy OF THE SHOULDER COMPLEX

Is Manual Physical Therapy Effective for the Shoulder?



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OMPT for the Shoulder (SIS) SR&MA Results (Steuir 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)"

OPEN ACCESS

Effectiveness of conservative interventions including exercise, manual therapy and medical management in adults with shoulder impingement: a systematic review and meta-analysis of RCTs

David Steur^{1,2}, Marika Luitjens^{1,2}, Simon Chole^{1,2}, David Kelly^{1,2}, Anne La^{1,2}, Jan Kapteina^{1,2}, Tjara Vrijland^{1,2}

ABSTRACT

Objective: To evaluate the effectiveness of conservative interventions including exercise, manual therapy and medical management in adults with shoulder impingement. **Design:** Systematic review and meta-analysis of randomised controlled trials. **Setting:** The Netherlands. **Participants:** Adults with shoulder impingement. **Interventions:** Conservative interventions including exercise, manual therapy and medical management. **Measurements and Main Results:** The meta-analysis included 10 RCTs with a total of 1014 participants. The overall effect size was small to moderate. Exercise and manual therapy were the most effective interventions. **Conclusion:** Conservative interventions including exercise, manual therapy and medical management are effective in the management of shoulder impingement in adults. **Registration:** PROSPERO, 2016, CRD42016040000.

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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."

SYSTEMATIC REVIEW

The effectiveness of manual therapy for the management of musculoskeletal disorders of the upper and lower extremities: a systematic review by the Ontario Protocol for Traffic Injury Management (OPTIMA) Collaboration

David Steur^{1,2}, Marika Luitjens^{1,2}, Simon Chole^{1,2}, David Kelly^{1,2}, Anne La^{1,2}, Jan Kapteina^{1,2}, Tjara Vrijland^{1,2}

ABSTRACT

Background: Musculoskeletal disorders (MSDs) of the upper and lower extremities are common in the general population and they significantly impact on the health and quality of life of many people. Manual therapy is a non-pharmacological treatment option for the management of MSDs. **Objective:** To evaluate the effectiveness of manual therapy for the management of MSDs of the upper and lower extremities. **Design:** Systematic review. **Setting:** The Netherlands. **Participants:** Adults with MSDs of the upper and lower extremities. **Interventions:** Manual therapy. **Measurements and Main Results:** The meta-analysis included 10 RCTs with a total of 1014 participants. The overall effect size was small to moderate. Exercise and manual therapy were the most effective interventions. **Conclusion:** Manual therapy is effective in the management of MSDs of the upper and lower extremities. **Registration:** PROSPERO, 2016, CRD42016040000.

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Overview: OMPT for the Shoulder (SIS)

The Efficacy of Manual Therapy for Rotator Cuff Tendinopathy: A Systematic Review and Meta-analysis

Small study with a high number of events... (text partially obscured)

- "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"

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Shoulder Evidence Conundrum

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

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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*)

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Flaw in the Review Process for OMPT

Case Study (N=1) → RCT (N=Multiple) → SR+MA (N=Pooled)

- 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

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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

Picture above: (a) Ant Acromial enthesophyte; (b) bursal-side partial thickness SS tear. Image from Mulyadi et al. MRI of impingement syndromes of the shoulder. *Clinical Radiology* (2009) 64, 307e318.

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Hey SIS - Get a NEW Paradigm

Lewis J. "Rotator Cuff Tendinopathy: Navigating the Diagnosis- Management Conundrum". *JOSPT* 2015.

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

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Hey SIS - Get a NEW Paradigm

Lewis J. "Rotator Cuff Tendinopathy: Navigating the Diagnosis- Management Conundrum". JOSPT 2015.

New Paradigm? TBC for Shoulder?

1. Change the T-Spine posture
2. Change Scapular position
3. Change GHJ position
4. Symptom neuromodulation – manual therapy



Reference
<http://www.londonshoulderclinic.com/wp-content/uploads/2016/06/SMPV6-2016.pdf>

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OMPT for Shoulder Conditions SUMMARY

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

Study Design

Considerations:

A) OMPT Alone

B) OMPT with Exercise

C) Time Frame:

1. LAB Based

(Immediate Effects) vs.

2. Pragmatic

(Long Term Effects)

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Rhon. Ann Intern Med. 2014 Impingement / Tendinopathy

- 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%

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Rhon et al: Impairment based PT



Manual Therapy Specific for Shoulder Impingement / Tendinopathy

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



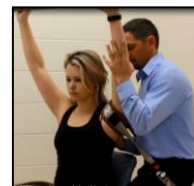
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MWM Shoulder



Stabilize scapula and apply posterolateral GH joint glide

With belt end range contract-relax



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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

Teys Manual Therapy 2008



- MWM vs Sham vs Control
- 1 Visit Only
- Stat Sig Difference ROM and Pain Pressure Threshold

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Delgado-Gil 2015 Shoulder MWM vs Sham

Journal of manipulative and physiological therapeutics


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

MWM
Sham

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MWM w Belt



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Scapular Specific Mobilization Evidence (SIS)

Scapular Retraction Test
(Kibler 2006 *Am J Sports Med*)



Scapular Assistance Test
(Rabin 2006 JOSP)



Scapular Reposition Test
(Tate 2008 JOSP)



Scapula Post Tilt and External Rotation avoiding Full Retraction

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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


Surenkok 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

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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)

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Adhesive Capsulitis – OMPT vs Injection



2014 Conclusions:

- *MT & EX not as effective as Steroid Injection*
- *Unclear Benefit*
- *Similar To Sham Ultrasound*

Page M, Green S, Kramer S, Johnston P, McBean B, Chiu M, Buchbinder R (2014). Manual therapy and exercise for adhesive capsulitis (frozen shoulder) (Review). The Cochrane Library.

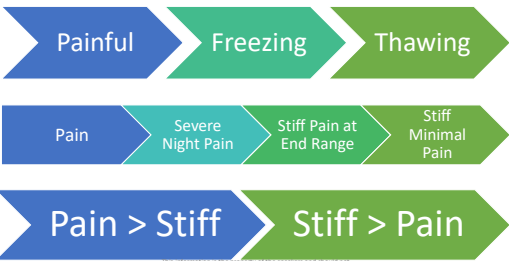
Kelley JOSPT. 2013 Adhesive Capsulitis CLINICAL PRACTICE GUIDELINE

Interventions Joint Mobilization "C" weak evidence

- Vermeulen. *Phys Ther.* 2006
- Bulgen. *Ann Rhem Dis.* 1984
- Nicholson. *JOSPT.* 1985
- Vermeulen. *Phys Ther.* 2000
- Chen. *Aust J Physio (N).* 2009
- Yang. *Phys Ther.* 2007
- Tanaka. *Clin Rheumatol.* 2010
- Johnson. *JOSPT.* 2007

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Adhesive Capsulitis Phases



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AC Outcomes OMPT - PAIN

Author	Journal	Result	Brief
Guler-Uysal	2004 <i>Swiss Med Wkly</i>	+	Cyriax approach
Vermeulen	2006 <i>PTJ</i>	=	Maitland - HI Grade (III-IV) better VS Lo Grade (I-II) *1 year★
Johnson	2007 <i>JOSPT</i>	=	Translational - POST Glide > ANT Glide for ER
Buchbinder	2007 <i>Arthritis Rheum</i>	=	Maitland + Spinal Mobs
Kumar	2012 <i>Rehabil</i>	+	Maitland & Ex vs EX only
Doner	2013 <i>J Rehabil Med</i>	+	MWM+Ex+TENS VS Ex+TENS alone
Park	2014 <i>J Phys Ther Sci</i>	+	Maitland+Kaltenborn+MWM & Distension vs Gen PT
Paul	2014 <i>Clin Ortho Relat Res</i>	=	Maitland mobs 10 min distraction Inferior Capsule
Espinoza	2015 <i>Medwave</i>	+	Posterior Mob vs Usual PT; Exclude HI Irritability★
Ali	2015 <i>Pak J Med Sci</i>	+	Maitland & Ex vs EX only: AP/PA/Inferior-Caudal
Agarwal	2016 <i>J Phys Ther Sci</i>	+	Reverse Mob vs Kaltenborn's caudal & post
Celik	2016 <i>Clin Rehab</i>	=	Mobs Inf/Ant/Post + ROM Ex VS ROM Ex only (*1yr)

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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

Hoogeboom 2012 *PloS one*

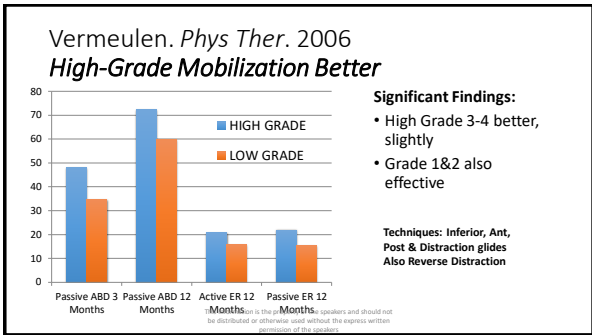
- Patient Eligibility
 - Patient Selection
 - Irritability?
- Competences and setting
 - Who provided the intervention?
 - Intervention matched ?
- Rationale
- Content
 - Intensity monitored
 - Adjusted & Personalized
- Adherence
 - What is acceptable

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AC Outcomes OMPT - ROM

Author	Journal	Result	Brief
Nicholson	1985 JOSPT	=	Mobilization all directions+ Ex VS Ex only
Guler-Uysal	2004 Swiss Med Wkly	+	Cyriax approach
Vermeulen	2006 PTJ	+	Maitland - HI Grade (III-IV) better VS Lo Grade (I-II) *1 year
Buchbinder	2007 Arthritis Rheum	+	Maitland + Spinal Mobs
Johnson	2007 JOSPT	+	Translational- POST Glide > ANT Glide for ER
Tanaka	2010 Clin Rheum	+	Mobilization - HEP adherence did best
Kumar	2012 Rehabil	+	Maitland & Ex vs Ex only
Yang	2012 Man Ther	+	Maitland End Range + Scap Mobs VS Mid Range Mob + EX
Doner	2013 J Rehabil Med	+	MWM added to usual PT of Modalities + Ex
Park	2014 J Phys Ther Sci	+	Maitland+Kaltenborn+MWM & Distension vs Gen PT
Paul	2014 Clin Ortho Relat Res	=	Maitland mobs 10 min distraction Inferior Capsule
Ali	2015 Pak J Med Sci	=	Maitland & Ex vs Ex only: AP/PA/Inferior-Caudal
Espinoza	2015 Medwave	+	Posterior Mob vs Usual PT, Exclude HI Irritability
Agarwal	2016 J Phys Ther Sci	+	Reverse Mob vs Kaltenborn's caudal & post
Celik	2016 Clin Rehab	+	Mobs Int/Ant/Post + ROM Ex vs ROM Ex only (*1yr)

Adapted & Updated from Noten 2016 Arch Phys Med Rehab
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Park 2014 J PT Sci

- Intensive mobilization + steroid injection with capsular distension (IMSID); = Maitland Mobs; End Range, Kaltenborn and MWM
- Intensive mobilization (IM); = Maitland Mobs; End Range, Kaltenborn and MWM
- Steroid injection with capsular distension (SID);
- General physical therapy only (GPT) = Hot Pak, TENS, Diathermy (No ex listed) ALL Groups? Stretching HEP?

Hydrodistension under Fluoroscopy

the needle has been introduced into the shoulder and initially only a small amount of saline & contrast can be injected

after hydrodistension the capsule has been opened up to take 25-35 ml of saline & contrast, some fluid has extravasated out of the joint

Image from: <http://www.physiotherapy.co.uk/kolbwh/rom-shoulder/>

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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

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Taking The Gloves Off References Shoulder Tendinopathy


Kolb WH (@KolbWJ)

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Taking The Gloves Off: Kolb WH (@KolbWJ) References Frozen shoulder contracture syndrome


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Clinical Decision Making



RASMUSSEN COLLEGE

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ORTHOLOGY
physical wellness

"Good decisions come from experience. Experience comes from making bad decisions."
 - Mark Twain
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Your next patient

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

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

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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?

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Clinical Decision Making

Doody & McAteer. *Physiotherapy*. 2002

Criterion	Novices	Experts
Mean number of hypotheses generated*	9.2	12.7
Mean time to generate first hypothesis (seconds)	108 (SD 63.60)	112 (SD 62.17)
When majority of hypotheses were generated	Physical Exam	Subjective Exam
Mean time to complete subjective exam*	8.60 (SD 2.83)	14.22 (SD 6.47)
Mean time to complete physical exam*	20.00 (SD 7.92)	13.93 (SD 5.37)
Mean treatment time	22.10 (SD 15.12)	17.88 (SD 12.85)
Total Time with evaluation	44.92 (SD 17.87)	46.00 (SD 10.60)
Ratio of time on subjective exam versus physical exam	1 : 2.32	1 : 1
Errors in clinical reasoning	Errors	No errors
Completion of clinical reasoning processes	Incomplete	Complete

* Statistically significant p < 0.05

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Clinical Decision Making Differences

<p>Novice</p> <ul style="list-style-type: none"> • Closed interviews • Data evaluation • Process driven • Judgment after data • Current knowledge about tests • Skills are not automatic • Routine Evaluation/Treatment • Reflection on Action 	<p>Expert</p> <ul style="list-style-type: none"> • Open interviews • Intuitive data gathering • Prioritization driven • Diagnostic/Pattern recognition • Testing for intervention success • Ability to multi-task • Improvisational Performances • Reflection in/for Action
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Clinical Decision Making Differences

- Doody & McAteer. *Physiotherapy*. 2002
- May et al. *Aust J Physiother*. 2008
- Frew et al. *Hong Kong J Occ Ther*. 2008.
- Wainwright et al. *Phys Ther*. 2010.
- Elvén et al. *Physiother Theory Pract*. 2015.
- Roots et al. *Int J Osteopath Med*. 2016

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Other Professionals Allen, et al. *Int J Med Inform.* 1998

Novice	Residents	Expert
Med Students -Less accurate initial hypothesis -Inefficient gathering strategies (data) -Higher proportion of negative question (r/o)	Residents -Less ability to gather evidence for competing diagnosis -Often use negative evidence or questions when hypothesis is unclear -Segmented information from competing diagnosis	Physicians -More accurate initial hypothesis -Use more predictive or positive questions to refine diagnosis

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Clinical Reasoning: A Developmental Process

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Good Clinical Decision Making

- Where do you start?

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How to build your clinical decision making

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

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Hypothesis-Algorithm for Clinicians Rothstein, et al. *Phys Ther.* 2003.

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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.

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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

Patient Signs & Symptoms
↓
Appraisal of data
↓
Remaining Hypothesis

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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.

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Forward thinking and pattern recognition require better problem representation

- Incorporate all significant symptoms and signs
- Describe them as accurately as possible
- Emphasize the most specific features
- Avoid distracting by minor signs, symptoms or non specific findings
- Match the patients presentation to classic disease description

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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

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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

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Evidence Based Practice

"The conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients." - Sacket, et al. *BMJ*. 1996.

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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.

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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
 - Patient Preference

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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.
- Bialosky, et al. *Phys Ther*. 2010.
- Puentedura, et al. *J Orthop Sports Phys Ther*. 2012.

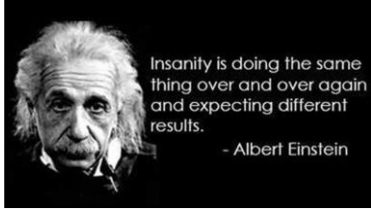
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How to build your clinical decision making

- 1) Build your Hypotheses Generation Ability
 - HOAC II Tool
 - SCRIPT Tool
 - Forward Thinking
 - Pattern Recognition
- 2) Evidence Based Practice
 - Clinician Experience
 - Best Research
 - Patient Preference
- 3) Test – Treat - Retest

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Clinical Reasoning?????



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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 of you (n=1)
 - Test, Treat, 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.

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Shoulder Case

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