Therapeutic Exercise and Manual Therapy:

Analysis of the Independent and Synergistic Effects

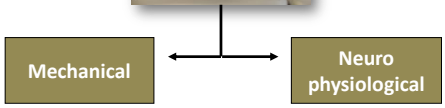
Bob Boyles, PT, DSc, OCS, FAAOMPT
Clinical Associate Professor
U of Puget Sound

Danny McMillian, PT, DSc, OCS, CSCS
Clinical Associate Professor
U of Puget Sound

Outline

- Theoretical basis for combining exercise and manual therapy
- Evidence for MPT and therapeutic exercise
  - Independent and synergistic effects
- Selected musculoskeletal applications

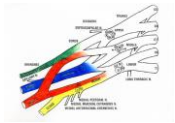
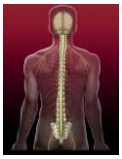
Theoretical Basis for Manual Therapy



Bialosky, et al, The Mechanisms of Manual Therapy in the Treatment of Musculoskeletal Pain: A Comprehensive Model, *Manual Therapy*, 2009

Neurophysiological

- Peripheral Nervous System
- Spinal Cord Mech
- Supraspinal Mech


Narrative Review

A regional interdependence model of musculoskeletal dysfunction: research, mechanisms, and clinical implications

Derrick G. Sueki[1], Joshua A. Cleland[2], Robert S. Wainner[3]

- Responses to a disorder or condition and the associated clinical outcomes are not limited to local or adjacent regions of the body but can involve a neuromuscular response that can be more widespread.


Spinal Manipulative Therapy Has an Immediate Effect on Thermal Pain Sensitivity in People With Low Back Pain: A Randomized Controlled Trial

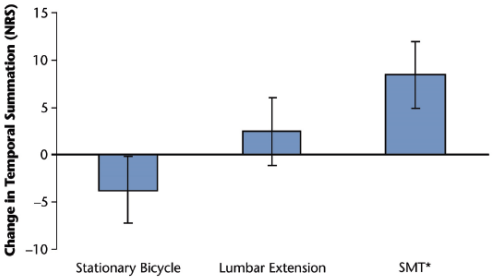
Joel E. Bialosky, Mark D. Bishop, Michael E. Robinson, Giorgio Zeppieri Jr, Steven Z. George

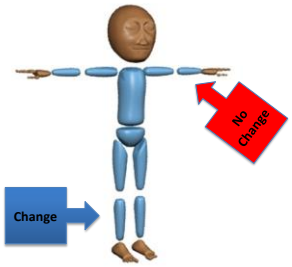
36 Subjects with LBP

- Manip
- Bike
- Extension



Temporal Summation: C-fiber



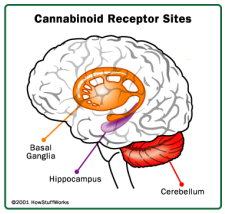


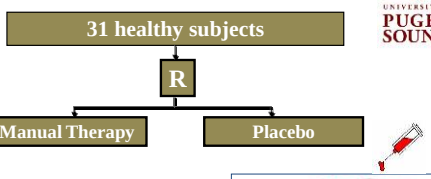
JAOA ORIGINAL CONTRIBUTION

JAOA • Vol 105 • No 6 • June 2005

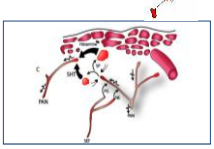
Cannabimimetic Effects of Osteopathic Manipulative Treatment

John M. McPartland, DO; Andrea Giuffrida, PhD; Jeremy King, MSc; Evelyn Skinner, DO; John Scotter, MSc; and Richard E. Musty, PhD



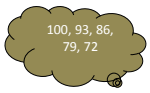


- Outcomes:
  - Drug Reaction Scale
  - Anadanide (AEA)
    - Mimics effects of THC
  - 2-arachidonoylglyc
    - Activates cannabinoid receptor
  - Olelethanolamide
    - Binds to receptors that regulate satiety

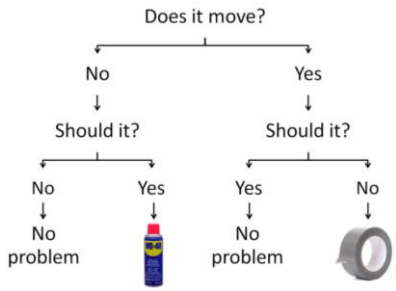


Results- DRS

- Manual therapy group:
  - More likely to report feeling-
    - Stoned, good, high and hungry
- Placebo group:
  - More likely to report feeling-
    - relaxed and rested



The Original Treatment-Based Classification System



Theoretical Basis for Therapeutic Exercise

Prevention of Impairments

Restoration of Function

Theoretical Basis for Therapeutic Exercise

- **S**pecific **A**daptation to **I**mposed **D**emand (S.A.I.D. Principle)
  - To the extent we have goals, the imposed demands must be specific.
    - Exercise v. therapeutic exercise
    - Working out v. training

Consider the well-documented effects of immobilization and zero gravity

Theoretical Basis for Therapeutic Exercise

- Motor Learning
  - Effective motor programs are adaptable to changing circumstances.
  - Because of skilled feedback, PT (v. generic Rx to "stay active") is best chance for creating an optimal motor program.

FEEDBACK

Theoretical Basis for Manual Therapy + Therapeutic Exercise

- **MT**
  - Immediate analgesic effect
  - Positive alteration in N-M tone
- **Ex**
  - Better quality of movement
  - Greater volume of activity
- **Mind**
  - Less kinesiophobia
  - Better habits regarding physical activity

Evidence by Region:

LBP

Do we know what causes most LBP?

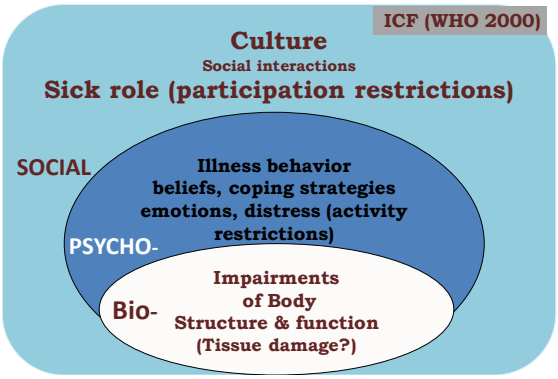
- We can only diagnose definite pathology in about 15% of patients with LBP.
- There is very little relationship between physical pathology & associated pain and disability.
- We regard back pain as an injury, but most episodes occur spontaneously with normal everyday activities.
- High-tech imaging tells us very little about simple backache.

The Medical Model of Disease

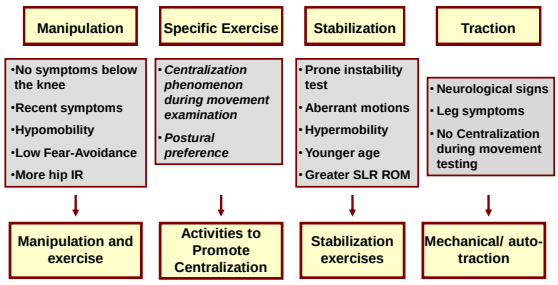
(Waddell, *Spine* 1987, Engel, *Science* 1977)

- The biomedical model has transformed from a model into cultural dogma.
- All disease must be explained in terms of derangement of underlying physical mechanisms.
- Not all conditions appear to fit, this is particularly true for LBP and also true for much of musculoskeletal medicine.

Is There An Alternative Model?



Low Back Pain Classifications



Low Back Pain
Strong Evidence For:

Manual Therapy

- Thrust Manipulation
  - Acute LBP and related buttock and thigh pain w/mobility deficits
- Thrust Manipulation and non-thrust mobilization
  - Spine/hip mobility deficits
  - Reduce pain and disability
  - Sub-acute and CLBP
  - Back related LE pain

Therapeutic Exercise

- Acute
  - Centralization and directional preference exercise
- Sub-acute and Chronic
  - Centralization and directional preference exercise
  - Trunk coordination
  - Strengthening
  - Endurance activities

Delitto, et al. Clinical Guidelines, *J Orthop Sports Phys Ther*. 2012

Low Back Pain
Pain v. Disability

Patient w/CLBP

- Manual Therapy, primarily MET
- Sham Manual Therapy
  - Position for MET
- Specific Exercise
  - tailored to treat their musculoskeletal dysfunctions
- Non-specific Exercise
  - general stretching and aerobic conditioning.

- The results suggest that ***pain reduction associated with CLBP does not necessarily lead to a change in function.*** These findings suggest that the factors that influence pain and disability among persons with CLBP may be different…psychosocial factors may need to be addressed
  - Geisser, *Clin J Pain*, 2005

Low Back Pain
Liccioardone, Ann Fam Med, 2013

- Osteopathic Manual Treatment (thrust, soft-tissue, muscle energy) v. Ultrasound v. Sham Ultrasound
- ***Pain reduction with OMT*** was statistically significant and clinically relevant. The OMT patients also reported less frequent concurrent use of prescription drugs.
- ***No change in back-specific functioning, general health, or work disability.***
- The OMT regimen associated with high levels of treatment adherence and satisfaction with back care.

Low Back Pain
MT + Ex v. Sham + Ex
Balthazard, BMC Musculoskeletal Disorders, 2012

- Sham = detuned ultrasound
- ***MT + active exercise reduced pain and disability***
- Abdominal muscle endurance decreased more in the MT group v. Sham group
  - Unexplained effect

Manual Therapy and Exercise Therapy in Patients w/CLBP
Aure, Spine, 2003

- Both groups improved, but the manual therapy approach resulted in significantly greater improvements than exercise therapy on spinal range of motion, pain, ***function***, general health, and sick leave.
  - Effects recorded up to 12 months.
- Buyer Beware: The manual therapy group did perform exercise
  - The patients also performed a subset of five general exercises for the spine, abdomen, and lower limbs, and six specific and localized exercises for spinal segments and the pelvic girdle in each treatment session ***"in order to normalize function."***

Stabilizing training compared with manual treatment in sub-acute and CLBP
Rasmussen-Barr, Man Ther, 2003

Short term

- No clear differences between the groups in the accessed outcome measures.
  - Pain
  - Health
  - Functional Disability

Long-term

- Stabilizing training more effective and reduced need for recurrent treatment periods.

Effect of Graded Exercise

Rasmussen-Barr, Spine, 2009

- A graded exercise intervention emphasizing stabilizing exercises seems to improve perceived disability and health parameters in short and long terms in patients with recurrent LBP.
- No such improvement was seen in the longer terms for perceived pain.
- The exercises, by being individually graded, ***might change self-efficacy beliefs*** and thus improve perceived disability.
- The exercise intervention seems to reduce the need for recurrent treatment in long-term.

MT + Ex + MD Consult v. MD Consult Alone for CLBP

Niemisto, Spine, 2003

Short, specific manipulative-treatment program with stabilizing exercises and physician's clinical examination, information, encouragement, and simple advice was more effective than physician consultation alone in ***reducing self-assessments of pain and disability*** for patients with chronic low back pain in a 1-year follow-up.

Meta-analysis of Exercise Strategies for CLBP

Hayden, Ann Intern Med 2005

- Best programs:
  - Individually designed
  - Supervised
  - High-dose v. low-dose
  - Multi-modal

Comparison of general exercise, motor control exercise and SMT manipulative therapy for CLBP
Ferreira, Pain, 2007

- Motor control exercise and spinal manipulative therapy produce slightly better short-term function and perceptions of effect than general exercise, but not better medium or long-term effects

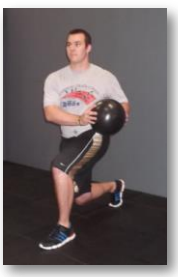
- Caveat:
  - Rx not controlled after 8W
  - General exercise group might have received effective co-interventions at that time

Low Back Pain
Exercise and Prevention

- Bigos, et al. High-quality controlled trials on preventing episodes of back problems: systematic literature review in working-age adults. *Spine J*, 2009.
- Level 1 Evidence
- Exercise prevented self-reported BPs in seven of eight trials
- Exercise significantly reduced work absence in three trials
- Not effective:
  - stress management, shoe inserts, back supports, ergonomic/ back education, & reduced lifting programs

Low Back Pain
Bigos, 2009, cont.

- Exercise Programs
  - Trunk strength, endurance, flexibility, stabilization, directional preference
  - 5/7 successful programs involved 45–60 min of supervised exercise, twice a week for 3–12 months,



Low Back Pain
Exercise and Prevention

- Moderate quality evidence that ***post-treatment*** exercise programmes can prevent recurrences of back pain but conflicting evidence was found for ***treatment*** exercise
  - Cochrane Review, 2010
- Rationale: Post-treatment exercise is about habits. Exercise as a treatment might or might not help in short time, but won't necessarily change habits and therefore future episodes.

Evidence by Region:

Neck Pain

MT and EX for Neck Pain: Systematic Review
Miller, Manual Therapy, 2010

- MT alone provides short-term pain relief.
- Exercise appears to improve pain and function over the long-term
- Combo therapy associated with
  - better short-term pain reduction than exercise alone
  - Better long-term outcomes in comparison to manual therapy alone.

Manipulation/Mobilization Systematic Review

(Gross, Cochrane Collaboration, 2010)

- 27 Trials, 1522 participants
- Cx manip/mob produced similar changes. Either may provide immediate- or short-term change; no long term data are available.
- Thoracic manipulation may improve pain and function.
- Optimal techniques and dose are unresolved.

cochrane The reliable source of evidence in health care

Which are the best exercises for neck pain?

Kay, Cochrane, 2007

- Moderate and low GRADE evidence suggests
  - specific neck stretching and strengthening exercises for chronic neck pain, improved function and satisfaction post-treatment to long term.
  - cranio-cervical endurance and low-load endurance exercises for subacute/chronic cervicogenic headache from post-treatment to long term.
  - no benefit for some upper extremity stretching and strengthening exercises or a general exercise program.

cochrane The reliable source of evidence in health care

Preventing Recurrence

"Rehabilitation of the neuromuscular and sensorimotor systems to a 'normative' status positively impacts on recurrence rate"

Gwen Jull, 2013

SPINE Volume 33, Number 22, pp 2371–2378
©2008, Lippincott Williams & Wilkins

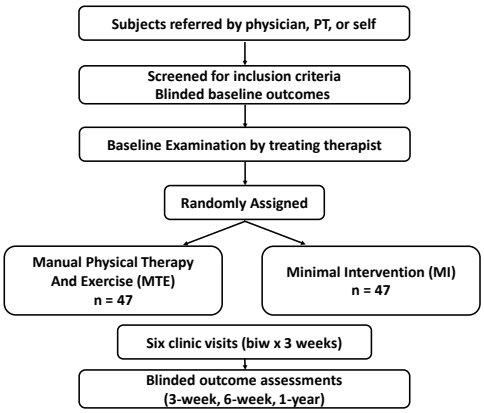
The Effectiveness of Manual Physical Therapy and Exercise for Mechanical Neck Pain

A Randomized Clinical Trial

Michael J. Walker, PT, DSc, OCS, CSCS, FAAOMPT,* Robert E. Boyles, PT, DSc, OCS, FAAOMPT,†
Brian A. Young, PT, DSc, OCS, FAAOMPT,‡ Joseph B. Strunce, PT, DSc, OCS, FAAOMPT,§
Matthew B. Garber, PT, DSc, OCS, FAAOMPT,¶ Julie M. Whitman, PT, DSc, OCS, FAAOMPT,‖
Gail Deyle, PT, DSc, DPT, OCS, FAAOMPT,** and Robert S. Wainner, PT, PhD, OCS, ECS, FAAOMPT††

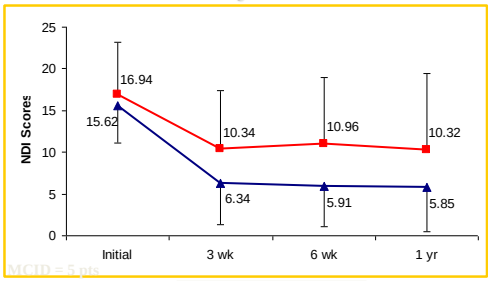
Rose Excellence in Research Award

The Best Research Article of 2009 in Orthopaedic Physical Therapy



Results

Neck Disability Index scores

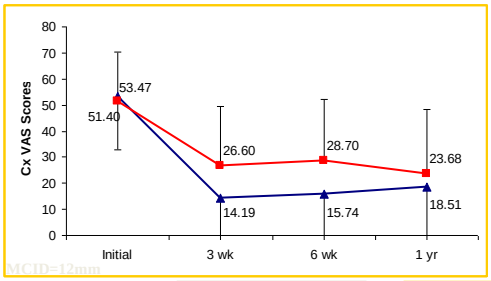


MCID = 5 pts

2x4 ANCOVA; p=0.010

Post-hocs; p≤0.001
(3, 6 and 52 week follow-ups)

Results
Cervical/Shoulder VAS scores

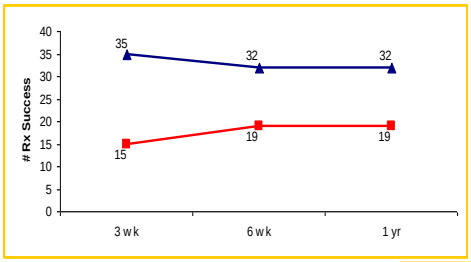


MCID=12mm

2x4 ANCOVA; p=0.016

Post-hocs; p≤0.004
(3 and 6 week follow-ups)

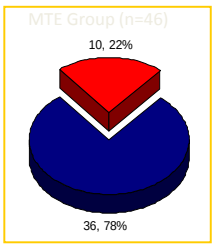
Results
Treatment Success Rates



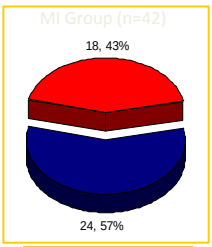
Chi-square tests; p≤0.007

Results
Follow-up Healthcare Sought (1-yr)

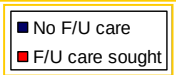
MTE Group (n=46)



MI Group (n=42)

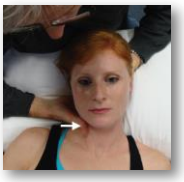


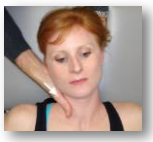
Intention to Treat Analysis
Chi-square test; p=0.112



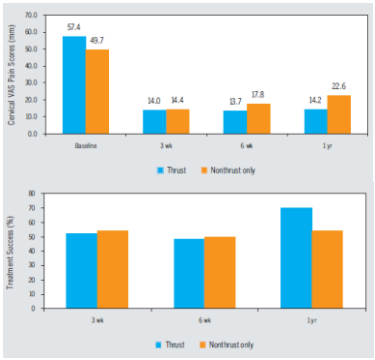
The Addition of Cervical Thrust Manipulations to a Manual Physical Therapy Approach in Patients Treated for Mechanical Neck Pain: A Secondary Analysis

- 47 patients
  - 23 received manip
  - 24 nonthrust mob only





Results



Does C-manipulation add benefit to supervised, high-dose exercise for chronic neck pain?

Evans, Spine, 2012

- N = 279, randomized to:
  - high-dose supervised EX + Manip
  - high-dose, supervised exercise alone
  - low-dose, home exercise and advice
- Outcome measures
  - Pain, disability, health status, global perceived effect, medication use, and satisfaction @ 4, 12, 26, 52 weeks.
- High-dose supervised exercise (with or without spinal manipulation) resulted in greater short-term pain reduction, global perceived effect, and satisfaction than low-dose home exercise for people with non-specific, chronic neck pain.
- 41% of HEP group had meaningful reduction in pain at short and long term
  - Cost implications

Effectiveness of manual physical therapy in the treatment of cervical radiculopathy: a systematic review

R Boyles, P Toy, J Mellon Jr, M Hayes, B Hammer

J Man Manip Ther, 2011

- *"…general consensus exists within the literature that using manual therapy techniques in conjunction with therapeutic exercise is effective in regard to increasing function, as well as AROM, while decreasing levels of pain and disability."*
- High quality RCTs featuring control groups are necessary to establish clear and effective protocols in the treatment of CR.

RESEARCH REPORT

Thoracic Spine Thrust Manipulation Versus Cervical Spine Thrust Manipulation in Patients With Acute Neck Pain: A Randomized Clinical Trial

J Orthop Sports Phys Ther 2011;41(4):208-220, Epub 18 February 2011. doi:10.2519/jospt.2011.3640

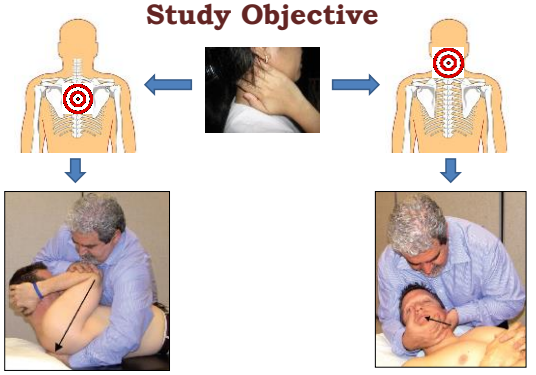
Emilio J. Puentedura, Merrill R. Landers, Joshua A. Cleland, Paul Mintken, Peter Huijbregts, Cesar Fernandez-de-las-Peñas

JOSPT

VOLUME 41 | NUMBER 4 | APRIL 2011

© 2011 JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY

Study Objective



Disability

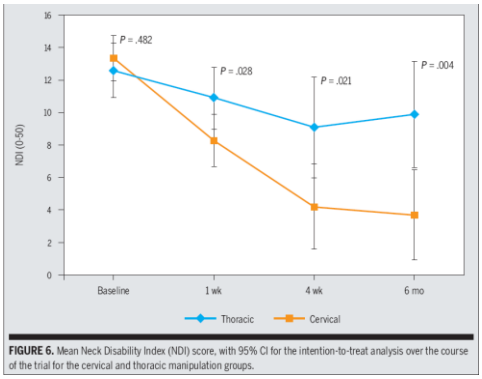


FIGURE 6. Mean Neck Disability Index (NDI) score, with 95% CI for the intention-to-treat analysis over the course of the trial for the cervical and thoracic manipulation groups.

Pain

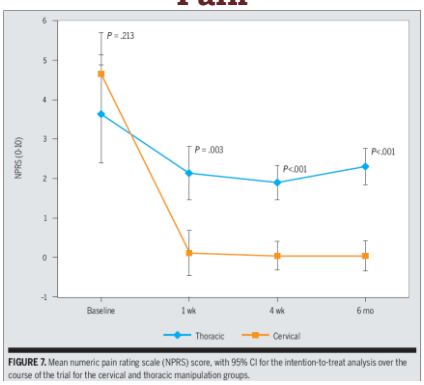


FIGURE 7. Mean numeric pain rating scale (NPRS) score, with 95% CI for the intention-to-treat analysis over the course of the trial for the cervical and thoracic manipulation groups.

GROC

Follow-up	Thoracic Group	Cervical Group
Treatment 2	0/10	13/14
1- week	2/10	14/14
4-weeks	2/10	14/14
6-months	2/10	14/14

Number of patients who reported GROC of at least +5 from baseline

EMILIO J. PUENTEDURA, PT, DPT, PhD* • JOSHUA A. CLELAND, PT, DPT, PhD† • MERRILL R. LANDERS, PT, DPT, PhD‡
PAUL MINTKEN, PT, DPT§ • ADRIAAN LOUW, PT, MSc¶ • CÉSAR FERNÁNDEZ-DE-LAS-PEÑAS, PT, MSc, PhD#

Development of a Clinical Prediction Rule to Identify Patients With Neck Pain Likely to Benefit From Thrust Joint Manipulation to the Cervical Spine

JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY | VOLUME 42 | NUMBER 7 | JULY 2012 | 577

Rose Excellence in Research Award
The Best Research Article of 2012 in Orthopaedic Physical Therapy

CPR for Cervical Manip

Puentedura et al JOSPT July 2012

≥ 3 factors present:

- Symptoms < 38 days
- Positive expectation that manipulation will help
- > 10° Difference rotation
- Pain with spring (PA) testing middle cervical spine

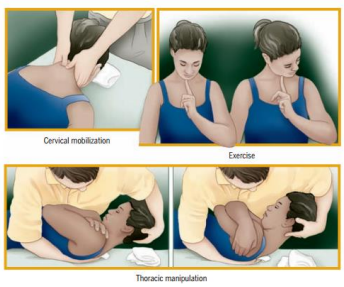
39%

90%

Pre-test Probability of Success → **+LR = 13.5** → **Post-test Probability of Success**

Addition of Thoracic Manipulation Improved Upon Cervical Mobilization and Exercise

UNIVERSITY of PUGET SOUND



Masaracchio, *J Orthop Sports Phys Ther*, 2013

Evidence by Region:

The Shoulder

Thoracic spine motion and shoulder function

- Hypomobility in the cervicothoracic (CT) increases risk of shoulder pain
  - Norlander 1998, Sobel, 1996
- Thoracic posture effects shoulder function
  - Bullock 2005, Lewis 2005
- Significant movement in the thoracic spine with arm elevation
  - Crosbie et al 2008
- Increased thoracic kyphosis may influence shoulder function by abducting the scapula on the thoracic wall
  - Bowling et al,1986

Thoracic spine motion and shoulder function

- Reduced thoracic mobility may directly contribute to a lack of full range of arm elevation
  - Bowling et al, 1986; Chapman, 1986; Crawford, 1993; Stewart, 1995
- Painful shoulder elevation may be caused by restricted cervicothoracic spine motion
  - Sobel et al, 1996, 1997; Norlander 1996, 1997, 1998; Griegel-Morris, 1992; Ludewig, 1998
- Treating the CT spine may enhance outcomes in subgroups of patients with shoulder pain
  - Winters 1997, Bergman 2004, Boyles 2008, Strunce 2009, Mintken 2010

Effectiveness of Manual Therapy on Painful Shoulder Conditions: A Sytematic Review

GH joint only across all painful shoulder conditions

- 7 articles fitting criteria
- 5 studies demonstrated benefits utilizing manual therapy for mobility, and 4 demonstrated trend towards decreasing pain values.
- Functional outcomes and quality-of-life measures varied greatly among all studies.
- Manual therapy appears to increase either active or passive mobility of the shoulder.
- A trend was found favoring manual therapy for decreasing pain, but the effect on function and quality of life remains inconclusive.

Comparison of Supervised Exercise With and Without Manual Physical Therapy for Patients With Shoulder Impingement Syndrome

Bang and Deyle, JOSPT, 2003

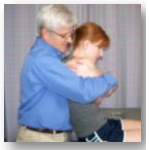
- Subjects (N= 52)
- Treatment conditions
  - Group 1: Manual therapy (upper quarter) and exercise
  - Group 2: Exercise alone; stretches and strengthening
  - 3-week intervention – biw for 6 Rx's
- Results
  - Function: significantly more improvement in MT group (35% vs 17%)
  - Pain: significantly less pain in MT group (70% vs 35%)
  - Strength: significant increase for MT group (16%)

- Conclusion: MT and exercise is superior to exercise alone for improving strength, function, and pain in patients with impingement syndrome

Positive Effects of Targeting the Thoracic Spine for Shoulder Pain

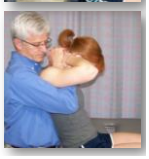
The Short Term Effects of Thoracic Spine Thrust Manipulation on Patients with Shoulder Impingement Syndrome Manual Therapy

Boyles & Ritland et al, 2008, *Manual Therapy*



The Immediate Effects of Thoracic Spine Manipulation on Patients with Primary Complaints of Shoulder Pain.

Strunce & Boyles et al, 2010, *JMMT*



Identifying Prognostic Factors for Successful Short-Term Outcomes in Individuals with Shoulder Pain Receiving Cervicothoracic Manipulation

Paul Mintken, Josh Cleland, Kristin Carpenter, Mel Bieniek, Mike Keirns, Julie Whitman

Physical Therapy January 2010

The Rule

3 or more present:

- Painfree shoulder flexion < 127^0
- Shoulder IR < 53^0
- Negative Neer test
- Not taking medications
- Symptoms < 90 days

61%

89%

Pre-test Probability of Dramatic Success with Manipulation → +LR = 5.3 → Post-test Probability of Dramatic Success with Manipulation

In the works.....

Manual physical therapy versus subacromial corticosteroid injection for the treatment of shoulder impingement syndrome: a randomized clinical trial.

Rhon, Boyles & Cleland

Currently in Review

In the works.....

Validation of a Clinical Prediction Rule to Identify Patients with Shoulder Pain Likely to Benefit from Cervicothoracic Manipulation: A Randomized Clinical Trial

Mintken, Cleland, Boyles, Carpenter, Michener, Burns, Strunce, & McDevitt

In data collection phase

The Effect of Therapeutic Exercise and Mobilization on Patients With Shoulder Dysfunction:

- Brudvig, *JOSPT*, 2011
- SR w/Meta-analysis
- Included all RCTs for shoulder dysfunction resulting in pain, restriction of ROM and/or limitation in function
- Inconclusive that combined therapy is superior to therapeutic exercise alone
- Cannot rule out that one treatment is more beneficial than the other.

Chronic RTC DZ

Bennell, BMJ, 2010

Conclusion: manual therapy and home exercise did not confer additional immediate benefits for pain and function compared with a realistic placebo treatment that controlled for therapists' contact in middle aged to older adults with chronic rotator cuff disease. However, greater improvements were apparent at follow-up, particularly in shoulder function and strength, suggesting that ***benefits with active treatment take longer to manifest.***

Comprehensive Impairment-Based Ex and MT Intervention for Patients w/Subacromial Imp. Syndrome: A Case Series

Tate, JOSPT, 2010

- N=10 w/10 visits in 6-8 W.
- 3-phase progressive strengthening, manual stretching, thrust and non-thrust manipulation to the shoulder/spine, patient education, activity modification, QD HEP of stretching/strengthening.
- Outcomes at 2/4/6/12W
- Success
  - 50% improved DASH
  - "Moderately better" on the GROC
  - At 6W
    - 6/10 successful
  - At 12W
    - 8/10 successful

Shoulder Impingement

Krommer, J Rehabil Med, 2013

- MT + EX v. EX only
- All treatments individualized
- Both groups had 10 treatments over 5 weeks w/HEP for 7 more weeks.
- Primary outcome measures at 5 and 12 W: Shoulder Pain and Disability Index, and Patient's Global Impression of Change.
- **Both groups showed significant improvements**
- **No difference between groups** for the primary and secondary outcomes
- Only the results for mean pain differed at 5 weeks in favor of the intervention group.

Frozen Shoulder

- Mobilization Techniques in Subjects With Frozen Shoulder Syndrome: Randomized Multiple-Treatment Trial

  Jing-lan Yang, Chein-wei Chang, Shiau-yee Chen, Shwu-Fen Wang, Jiu-jenq Lin *Physical Therapy*. 87 (10), 2007

- Effectiveness of the end-range mobilization and scapular mobilization approaching a subgroup of subjects with frozen shoulder syndrome: A randomized control trial

  Jing-lan Yanga, Mei-Hwa Janb, Chein-wei Changa, Jiu-jenq Linb *Manual Therapy*, 2011

Translational Manipulation

Evidence Status

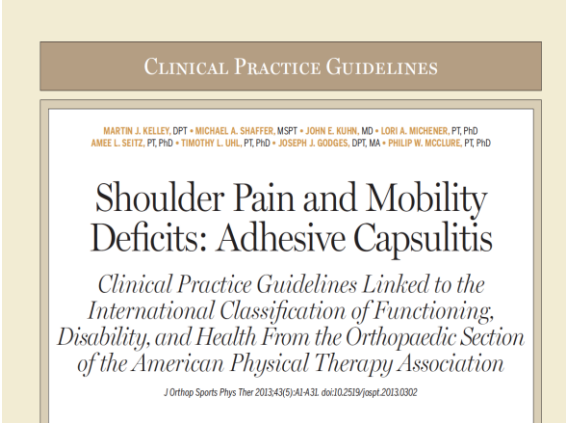
- Roubal, 1996, Case Series (n=8)
- Placzek, 1998, Case Series (n=31)
- Placzek, 2004, Guidelines & Case Report (n=1)
- Boyles, 2005, Case Series (n=4)
- Roubal, 2006, Case Report (n=1)
- Hando, 2012, Case Series (abstract, n=15)
- Rendeiro, 2012, Prospective cohort (n=9 with tManip)

Total: 69 subjects

Translational Manipulation

Conclusions

- Translational manipulation is effective and safe
- Potentially less risk of harm to GH structures compared to long-lever manipulation
- Need more comparisons to other management approaches



Clinical Practice Guidelines: Adhesive Capsulitis

MAY 2013 | VOLUME 43 | NUMBER 5 | JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY

INTERVENTION – JOINT MOBILIZATION: 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. (Recommendation based on weak evidence.)

INTERVENTION – TRANSLATIONAL MANIPULATION: Clinicians may utilize translational manipulation under anesthesia directed to the glenohumeral joint in patients with adhesive capsulitis who are not responding to conservative interventions. (Recommendation based on weak evidence.)

Clinical Practice Guidelines: Adhesive Capsulitis, cont.

MAY 2013 | VOLUME 43 | NUMBER 5 | JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY

INTERVENTION – STRETCHING EXERCISES: 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. (Recommendation based on moderate evidence.)

Evidence by Region:

Hip and Knee OA

Recommendations for OA of the *Hip or Knee* : Am. College of Rheumatology

Hochberg, Arthritis Care & Research, 2012

Strong Support

- Participate in aerobic and/or resistance land-based exercise
- Participate in aquatic exercise
- Lose weight (for persons who are overweight)

Conditional Rec.

- Receive manual therapy in combination with supervised exercise

EB recommendations for the role of exercise in the management of osteoarthritis of the hip or knee—the MOVE consensus – Rheumatology, 2005

- Multidisciplinary guidelines
- Established 10 'propositions' with 'strength of evidence grades (1A through 4)
  - 1A – Meta-analysis of RCT; 1B – ≥ 1 RCT
  - 2A - ≥ 1 controlled trial without randomization
  - 2B – at least one quasi-experimental study
  - 3 – descriptive studies
  - 4 – expert reports / opinions

MOVE Consensus

1. Both **strengthening & aerobic** exercise can reduce pain and improve function and health status in individuals with knee and hip OA (1B knee; 4 hip)
2. **Few contraindications** to prescription of strengthening or aerobic exercise in individuals with hip/knee OA (4 both)
3. **Prescription** of both general (aerobic fitness training) and local strengthening exercises is an **essential** aspect of management of hip or knee OA (4 both)
4. Exercise therapy for OA of hip or knee should be **individualized** & patient-centered taking into account age, co-morbidity, and overall mobility (4 both)

MOVE Consensus

5. To be effective, exercise programs should include **advice and education** to promote a positive lifestyle change with an increase in physical activity (1B advice/education; 4 that these are required for ex program to be effective)
6. Group ex and home ex are equally effective and **patient preference** should be considered (1A to support group and home, but no head to head comparison has been made)
7. **Adherence** is the principal predictor of long-term outcome from exercise in pts with hip or knee OA (1B as a predictor, 4 as principal predictor)

MOVE Consensus

8. Strategies to improve and maintain **adherence** should be adopted (long-term monitoring/review and inclusion of spouse/family in ex) (1B from gen ex literature, 4 for specific hip/knee evidence)
9. The effectiveness of exercise is **independent** of the presence or severity of **radiographic** findings (4)
10. Improvements in muscle **strength and proprioception** gained from exercise programs may **reduce the progression** of knee and hip OA (4)

Keep Moving…it is not rocket science!

Comparison of Manual Therapy and Exercise Therapy in Osteoarthritis of the Hip: A Randomized Clinical Trial

- Subjects: 109 patients with hip OA
- Treatment conditions
  - Group 1: Manual therapy for hip joint
    - Distraction mobilizations/manipulations and hip stretching
  - Group 2: Exercise therapy
  - 5-week intervention – biw for 9 Rx sessions
- Outcomes: 5-, 17-, 29-wk follow-ups
  - Primary: Patient perceived improvement
  - Secondary: Harris Hip Score, timed walk test, VAS pain for main complaint, ROM

(*Hoeksma et al, Arthritis Rheum, 2004)*

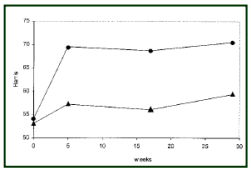
Comparison of Manual Therapy and Exercise Therapy in Osteoarthritis of the Hip, cont.

- Manual physical therapy
  - Session started with stretching of shortened muscles
  - Traction of the hip joint, followed by traction manipulation in each limited position
  - All manipulations repeated during each session until optimal results
- Exercise therapy
  - Program adjusted to individual symptoms and designed to improve muscle function, length, joint mobility, pain relief, and walking ability
  - Home exercise program

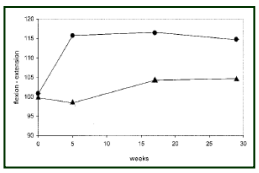
(*Hoeksma et al, Arthritis Rheum, 2004)*

Comparison of Manual Therapy and Exercise Therapy in Osteoarthritis of the Hip: A Randomized Clinical Trial

- Perceived recovery: significantly more improvement in MT group (81% vs 50%)
- Significant benefits in MT group for function, pain, and ROM



Harris Hip Score (function)



Flexion-Extension ROM

(*Hoeksma et al, Arthritis Rheum, 2004)*

Clinical Outcomes Following Manual Physical Therapy and Exercise for Hip Osteoarthritis: A Case Series

- Subjects: 7 patients with hip OA (per ACR)
- Treatments:
  - Manual Therapy (thrust and nonthrust): Caudal, caudal/medial, lateral, and PA glides
  - Exercise: abductor and ER strengthening, stretches, ex bike

(*MacDonald et al, JOSPT, 2006)*

Clinical Outcomes Following Manual Physical Therapy and Exercise for Hip Osteoarthritis: A Case Series

- Results:
  - # treatment sessions: median = 5 (range, 4-12)
  - Hip ROM: median increase of 82° (range, 70-86°)
  - Harris Hip Score: median increase of 25 pts (range, 15-38 pts)
  - NPRS: average decrease of 5 pts (range, 2-7 pts)
- Conclusion: Supports combined use of MT and exercise for patients with hip OA

(*MacDonald et al, JOSPT, 2006)*

Short- and long-term clinical outcomes following a standardized protocol of orthopedic manual PT and exercise in individuals with hip OA: a case series
Hando, Man Manip Ther, 2012

- Methods: Fifteen consecutive subjects (9 males, 6 females; mean age: 52±7.5 years) with unilateral hip OA received an identical protocol of manual therapy and therapeutic exercise interventions. Subjects attended 10 treatment sessions over an 8-week period for manual therapy interventions and performed the therapeutic exercise as a home program.

Short- and long-term clinical outcomes following a standardized protocol of orthopedic manual PT and exercise in individuals with hip OA: a case series
Hando, Man Manip Ther, 2012

- Results:
  - Clinically meaningful short and long term improvements in outcomes following a standardized protocol of manual therapy and therapeutic exercise interventions.

Knee OA Syst. Review & Meta-analysis: Comparing Self-Management Education With or Without Exercise Brand, JOSPT, 2013

- 24 studies
- Analyzed effect on arthritis self-efficacy
- Results:
  - Small-mod effect size observed for both
  - ***Adding exercise to self-management education programs did not add value***
- Implication
  - Social cognitive theory concepts should be included in exercise interventions
  - i.e., ***set goals, develop individualized action plans, identify rewards, self-monitor progress, and use social supports***

High v. Low Intensity Resistance Training for Patients With Knee OA

Jan, PTJ, 2008

- Both high- and low-resistance strength training significantly improved clinical effects in this study. The effects of high-resistance strength training appear to be larger than those of low-resistance strength training for people with mild to moderate knee OA, although the differences between the HR and LR groups were not statistically significant

Manual therapy, exercise therapy, or both, in addition to usual care, for hip/knee OA

"As both manual therapy and exercise therapy appear effective, in addition to usual care alone, depending on the outcome of interest, the choice of therapy should be determined by patient characteristics and ***patient choice****."*

Abbott, *Osteoarthritis and Cartilage*, 2013

Effectiveness of Manual Physical Therapy and Exercise on Osteoarthritis of the Knee: A Randomized, Controlled Trial

Deyle et al, Ann Inter Med, 2000

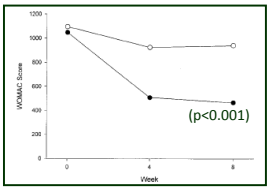
- Subjects: 83 patients with knee OA
- Treatment conditions
  - Group 1: Manual therapy and Exercise (impairment-based for LS, hip, knee, and ankle joints)
  - Group 2: Subtherapeutic US
  - 4-week intervention – biw for 8 Rx sessions
- Outcomes (initial, 4-wk, 8-wk, 1-yr)
  - 6-minute walk distance
  - WOMAC score

Rose Excellence in Research Award
The Best Research Article of 2009 in Orthopaedic Physical Therapy

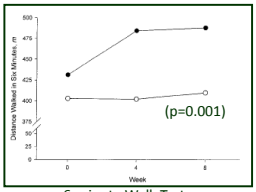
Effectiveness of Manual Physical Therapy and Exercise on Osteoarthritis of the Knee, cont.

Deyle et al, Ann Inter Med, 2000

- Significant improvement in MTE group for WOMAC scores, walk test, and surgery rates



WOMAC Score



6-minute Walk Test

Effectiveness of Manual Physical Therapy and Exercise on Osteoarthritis of the Knee, cont.

Deyle et al, Ann Inter Med, 2000

1-year results	MTE Group (n=42)	Placebo Group (n=41)
Surgery Rates	2 (5%)	8 (20%)
Steroid injections	2 (5%)	6 (15%)

Conclusion: Manual physical therapy and exercise results in functional improvements and may delay surgery for patients with knee OA

Home Based Exercise Program for Knee Pain & Knee OA: Randomized Controlled Trial

Thomas et al, BMJ, 2002

- 786 patients into 4 groups
  - Exercise therapy
  - Monthly phone contact
  - Exercise therapy + phone contact
  - No intervention
- WOMAC at 2 years
- Highly significant reduction in knee pain for pooled exercise groups
- Conclusion: A simple home based exercise program can significantly reduce knee pain

Physical Therapy Treatment Effectiveness for Osteoarthritis of the Knee: A Randomized Comparison of Supervised Clinical Exercise and MT Versus a HEP

Deyle et al, Phys Ther, 2005

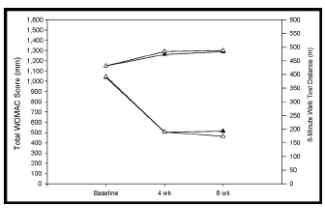
- Subjects: 134 patients with knee OA
- Treatment conditions
  - Group 1: Manual therapy, supervised exercise, and HEP (impairment-based for LS, hip, knee, and ankle joints)
  - Group 2: Home exercise program
  - 4-week intervention – biw for 8 Rx sessions
- Results: (initial, 4-wk, 8-wk, 1-yr)
  - Significant improvement in WOMAC scores
    - 52% MTE group; 26% HEP group
  - Similar improvements in 6-minute walk distance (~10%)

Physical Therapy Treatment Effectiveness for Osteoarthritis of the Knee: A Randomized Comparison of Supervised Clinical Exercise and MT Versus a HEP, cont.

Deyle et al, Phys Ther, 2005

Conclusion: HEP for knee OA is effective; Manual therapy and supervised exercise improves symptomatic relief

Result reproducibility for MTE; comparison with Deyle et al, 2000



Clinical Hip Tests And A Functional Squat Test In Patients With Knee Osteoarthritis: Reliability, Prevalence Of Positive Test Findings, And Short-term Response To Hip Mobilization

Cliborne AV et al, *JOSPT*, 2004

- Purpose:
  - Examine short-term effects of hip mobilizations
  - Identify prevalence of painful hip symptoms
- Methods:
  - 22 pnts with knee OA; 17 asymptomatic pnts
  - Hip tests: Functional Squat, FABER, Hip Flexion, Hip Scour
  - Hip mobilizations: Caudal glide, AP glide, PA glide, PA in FABER position
- Outcomes:
  - Pre- and post-mobilization measurements
    - % of knee OA patients with positive hip tests
    - NPRS for each hip test
    - ROM for each hip test (except hip scour)

Mobilization Procedures

Anterior-Posterior | Caudal Glide

Cliborne AV et al, *JOSPT*, 2004

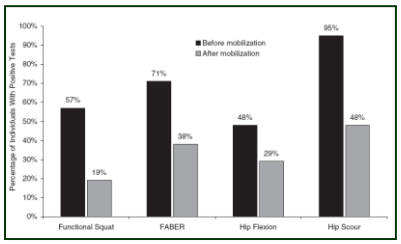
Mobilization Procedures

Posterior-Anterior in Flexion/Abduction/ External Rotation

Posterior-Anterior

Cliborne AV et al, *JOSPT,* 2004

Results

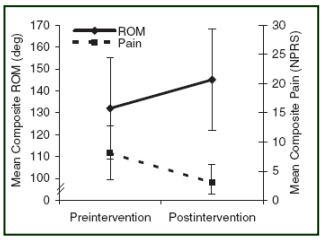


Significant decrease (p<0.05) in prevalence of positive test results (except Hip Flexion) post-treatment

Cliborne AV et al, *JOSPT,* 2004

Results

Cliborne AV et al, *JOSPT,* 2004



- Significant improvement in Pain and ROM following treatment
- Change score: NPRS = 3.9pts; ROM = 13 degrees

Conclusion

- Hip assessment may be beneficial in the examination of patients with knee OA
- Impairments improved, positive test findings were reduced after a single treatment session
- Further work needed to determine the effect of hip mobilization on function and disability

Cliborne AV et al, *JOSPT*, 2004

Development of a Clinical Prediction Rule to Identify Patients with Knee Osteoarthritis who Respond Favorably to Short-Term Hip Mobilizations

Currier et al, *Physical Therapy*, 2007,

Inclusion Criteria

(Altman et al, *Arthritis Rheum* 1986)

Knee pain & 3 of the following:

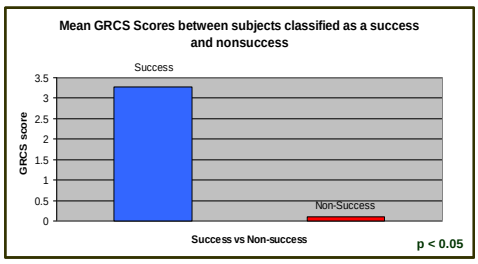
- Age 50-80 years old
- Palpable bony enlargement
- Morning stiffness < 30 minutes
- Knee crepitus
- Bony tenderness to palpation
- No palpable warmth of the synovium

Clinical Prediction Rule

Item	Sn	Sp	LR+	LR-
Hip/Groin Pain or Paresthesia	.20	.98	8.1	.82
Anterior Thigh Pain	.27	.95	5.1	.77
Pain with Hip Distraction	.13	.98	5.2	.89
Knee Flexion PROM < 122°	.32	.95	6.0	.72
Hip IR PROM < 17°	.32	.95	6.0	.72

Results

- 41 of 60 (68%) subjects responded successfully
- Single best item: pain or paresthesia in hip/groin (+LR=8.1)
- Combination of any 2 CPR items; +LR=12.9



Evidence by Region:

Ankle Sprain

Ankle Stability and Movement Coordination Impairments: Ankle Ligament Sprains

Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability and Health From the Ortho Section of the APTA

Acute Phase

Manual Therapy

Moderate evidence for lymphatic drainage, active and passive soft tissue and joint mobilization, and anterior-to-posterior talar mobilization procedures, within pain-free movement.

Therapeutic Exercise

- Strong evidence for early weight-bearing w/external support prn, progressing as tolerated.
- Strong evidence for general therapeutic exercise program.

Ankle Stability and Movement Coordination Impairments: Ankle Ligament Sprains

Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability and Health From the Ortho Section of the APTA

Sub-Acute+ Phase

Manual Therapy

- Strong evidence for graded joint mobs, manipulations, and WB/NWB mobilization with movement, to improve DF proprioception, and weight-bearing tolerance

Therapeutic Exercise

- Weak evidence for single-limb balance activities using unstable surfaces.
- Weak evidence for balance and sport-related activity training to reduce the risk of re-injury in athletes.

A Randomized Controlled Trial of a Passive Accessory Joint Mobilization on Acute Ankle Inversion Sprains

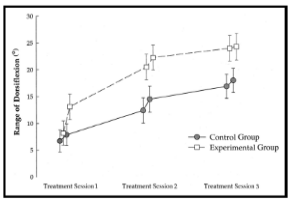
Green et al, Phys Ther, 2001

- Subjects: 41 patients with acute inversion sprains (<72 hrs)
- Treatment conditions:
  - Group 1: RICE (RG)
  - Group 2: RICE and AP mobilization (MG)
  - Six treatments over two weeks
- Outcome measures
  - Dorsiflexion ROM
  - Stride speed
  - Step length
  - Single support time

A Randomized Controlled Trial of a Passive Accessory Joint Mobilization on Acute Ankle Inversion Sprains, cont.

Green et al, Phys Ther, 2001

- **Results:**
  - **D/C by 4th treatment**: 13/19 in MG; 3/19 in RG (p<.01)
  - **Dorsiflexion**: significant gains over RICE alone (p<.01)
  - **Stride speed**: Greater increases in MG group after 1st and 3rd sessions (p<.05)
  - **Step length**: Greater increase in MG after 2nd session (p<.05)
  - **Single limb support time**: no difference



Dorsiflexion ROM

A Randomized Controlled Trial of a Passive Accessory Joint Mobilization on Acute Ankle Inversion Sprains, cont.

Green et al, Phys Ther, 2001

- Conclusion:
  - Addition of a talocrural mobilization to the RICE protocol in the management of ankle inversion injuries necessitated fewer treatments to achieve pain-free dorsiflexion and to improve stride speed more than RICE alone.

The Initial Effects of a Mobilization with Movement Technique on Dorsiflexion and Pain in Subacute Ankle Sprains *Collins et al, Man Ther, 2004*

- Subjects: 14 pnts w/ subacute Grade II ankle sprains
  - Repeated measures design
- Treatment conditions
  - Mobilization With Movement (MWM)
  - Placebo – firm elbow contact
  - Control – no manual contact
- Results
  - Significant increase in DF ROM post-MWM
  - No differences in pressure or thermal pain threshold
- Conclusion: MWM technique results in increased DF ROM post treatment

Initial Changes in Posterior Talar Glide and Dorsiflexion of the Ankle After Mobilization With Movement in Individuals With Recurrent Ankle Sprain Vicenzino et al, JOSPT, 2006

- N= 16, chronic lateral ankle sprain.
- Within subjects design.
- 3 conditions:
  - WB MWM
  - NWB MWM
  - Control
- Outcomes: WB DF ROM, Posterior talar glide ROM.

Initial Changes in Posterior Talar Glide and Dorsiflexion of the Ankle After Mobilization With Movement in Individuals With Recurrent Ankle Sprain

Results

* WB and NWB MWM techniques significantly improved posterior talar glide by 55% and 50% of the pre-application deficit between affected and unaffected sides, respectively, (P.001).
* WB and NWB MWM treatment techniques improved WB DF by 26% (P.017), compared to 9% for the control condition. Vicenzino et al, JOSPT, 2006

Efficacy of Mobilization with Movement for Patients with Limited Dorsiflexion after Ankle Sprain: A Crossover Trial

Reid et al, *Physio Canada*, 2007

- N = 23, ankle sprains within last 2 years, limited DF.
- Randomized cross over design.
- Sham vs. WB MWM
- Outcome: WB DF ROM
- Change in DF following
  - MWM: .63 cm
  - Sham: .18 cm

The Use of Manipulation in a Patient with an Ankle Sprain Injury not Responding to Conventional Management: A Case Report

Whitman et al, Man Ther, 2005

- Subject: 27yo volleyball player s/p inversion ankle sprain; chronic symptoms x 3 weeks
- Treatment interventions:
  - Manual therapy: proximal tib-fib manipulation, ankle distraction manipulation, TCJ AP glide, TCJ/STJ lateral glide, and ankle eversion mobilizations
- Results (4-day and 6-wk follow-up)
  - NPRS decreased from 7/10 to 1/10 to 0/10
  - PSFS increased from 5.5 to 10
  - Function: Crutches to 2 mile runs within 4 days
- Conclusion: Assess joint function and consider MT techniques early for patients s/p ankle sprains

Treatment of Cuboid Syndrome Secondary to Lateral Ankle Sprains: A Case Series

Jennings & Davies, *JOSPT*, 2005

- Subjects: 7 (5 male) w/ similar injuries of plantar flexion/inversion ankle sprains
  - Symptom duration (range, 1 day to 8 weeks)
- Treatment: 1-2 cuboid manipulations
- Results: All back to competitive activity after 1-2 visits.

Predicting Short-Term Response to Thrust and Non-thrust Manipulation and Exercise in Patients Post Inversion Ankle Sprain

Whitman et al, *JOSPT*, 2009

- N = 85
- Prospective Cohort design
- Standardized examination
- Standardized Intervention up to 2 visits.
- Success = at least +5 on GROC.
- Inclusion criteria:
  - GD I-II inversion ankle sprains, ages 16-60, at least 3/10 on NPRS.
- Exclusion criteria:
  - GD III sprain, +OAR, Red Flags, prior ankle/foot surgery, fractures.
- Days post injury
  - Mean: 22
  - Median: 11
- 13 subjects with symptoms > 90 days
  - 10 in success group
  - 3 in non-success group

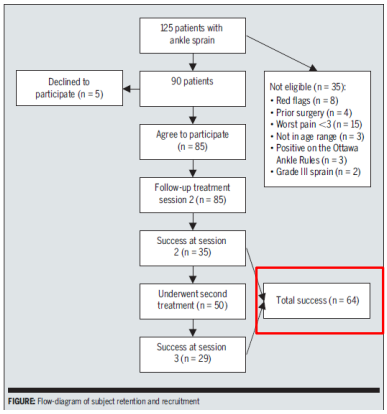
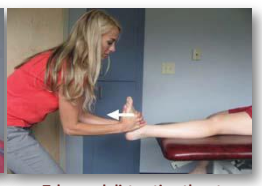


FIGURE: Flow-diagram of subject retention and recruitment

Manual Therapy Intervention Thrust Procedures

Whitman et al, *JOSPT*, 2009


Superior tib-fib P/A thrust


Talocrural distraction thrust

Max of 2 attempts based on presence of audible pop.

Manual Therapy Intervention Non-Thrust Procedures

Whitman et al, *JOSPT*, 2009


Rear foot eversion


Distal tib-fib a/p


Talocrural AP


Talocrural MWM in WB

Exercise Intervention

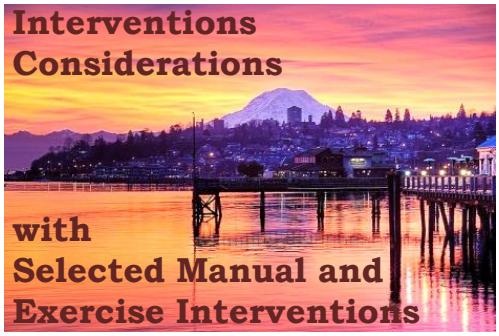
Whitman et al, *JOSPT*, 2009

- Achilles WB and NWB stretch 3 x 30 sec. each 2 x/day.
- Ankle 'Alphabet' 2x/day.
- Self mobilization TC & ST 3 x 30 reps.

Outcomes

- 75% met criteria for success within the first 2 visits.
- **4 predictor variables:**
  - **Symptoms worse when standing**
  - **Symptoms worse in the evening**
  - **Navicular drop > 5 mm**
  - **Distal tibiofibular joint hypomobility.**
- + LR for success with 3 of 4 variables = 5.90. 95% CI (1.08, 41.60)

Whitman et al, *JOSPT*, 2009



How will you decide if pain is ok?

TherEx is Prescribed and Progressed

- Which exercises are the best medicine
- What is the therapeutic dose?

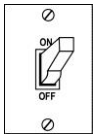
Rx

- How can we convince patients to consider exercise as medicine?
- How might we facilitate attention to dosing?

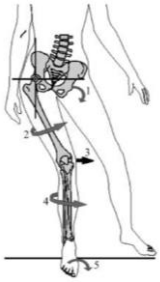
TherEx Considerations
Are the muscles…

…too loud?
- Rx
  - Inhibition
  - Lengthening

…too quiet?
- Rx
  - Activation
  - Strength/Endurance
  - Integration



"When we try to pick out anything by itself, we find it hitched to everything else in the universe."
---John Muir



Progress Exercise Based on the Physical Requirement

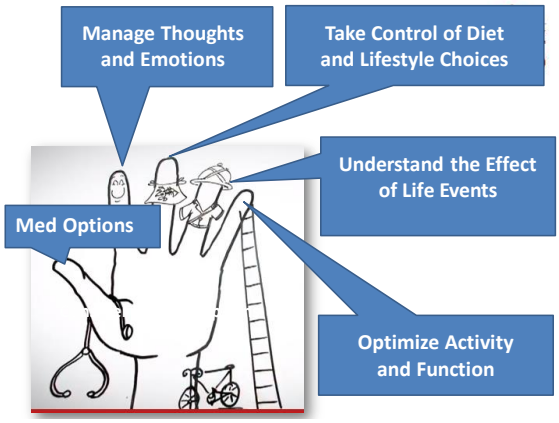
- Factors of Progression
  - Excursion
  - Speed
  - Load
  - Volume
  - Complexity

Which is more relevant for your gardener, golfer, soldier…?

Sources of Motivation

Managing Expectations

- Valid pain treatment can lose its clinical efficacy if patients do not expect pain relief.
- Consider previous experiences with ineffective treatments
  - Goffaux, Pain, 2007



Goals are not enough

Get patient buy in for specific tasks, not just agreement on goals.

Sense of Coherence

Def: A global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that one's internal and external environments are predictable and that there is a high probability that things will work out as well as can reasonably be expected

– Antonovsky 1979

Components of SoC

- **Comprehensibility**
  - understanding the nature of the problem
- **Manageability**
  - aka, agency
  - "You can do it!"
- **Meaningfulness**
  - Connect the dots from actions to goals

Physical therapists need to "search for words with clear, precise meaning and with connotations that do not evoke dread in the patient."

Phrases that scare

- Bone on Bone
- To a 29 y/o "you have the spine of an 80 y/o"
- You don't have a curve in your lower back
- Your SI is out of place
- This bone in your neck is rotated
- This rib is out

Phrases that heal

- The good news is…
- Normal age related changes…
- We see this a lot…

Bottom Line

Move It & Move On

Fire It & Fire On

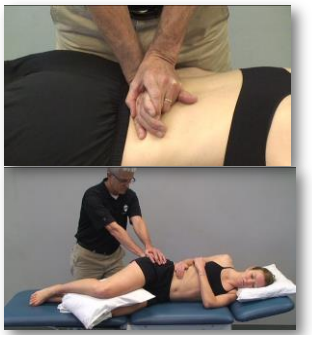
Educate and Assuage Fear!

Selected Manual and Exercise Interventions for Low Back Pain

Low Back Pain

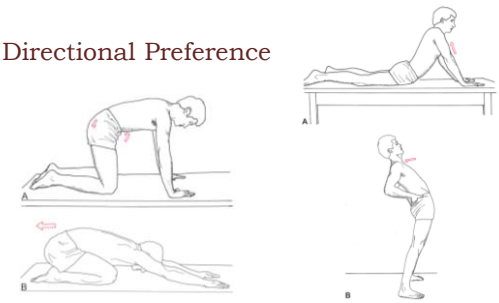
Manual Therapy Interventions

Low Back Pain
Manual Therapy Interventions



Low Back Pain
Ther Ex Interventions

Directional Preference

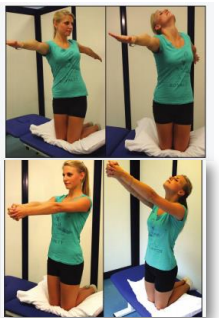


Kisner and Colby, Therapeutic Exercise, 6th Ed., F.A. Davis

Low Back Pain
Ther Ex Interventions

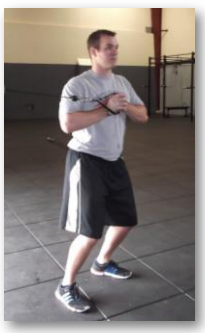
Low Back Pain
Ther Ex Interventions

Gatti, JOSPT, 2011



Low Back Pain
Ther Ex Interventions

Low Back Pain
Ther Ex Interventions



155

Low Back Pain
Ther Ex Interventions



156

Low Back Pain
Ther Ex Interventions



157

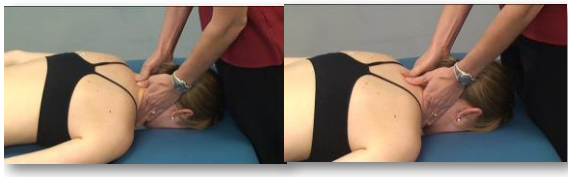
Low Back Pain
Ther Ex Interventions



158

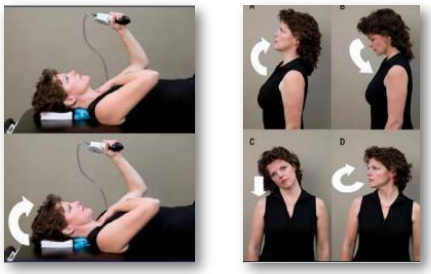
Neck Pain
Manual Therapy Interventions

Neck Pain
Manual Therapy Interventions



Neck Pain
Manual Therapy Interventions

Neck Pain
Ther Ex Interventions

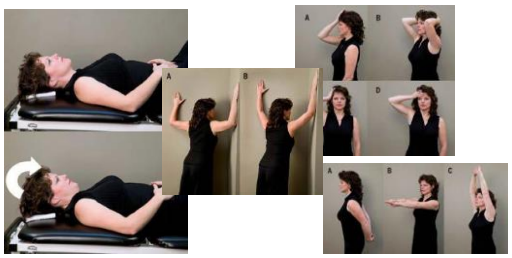


Phase 1 Gross, JOSPT, 2009

Neck Pain
Ther Ex Interventions

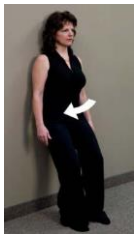
Phase 1
Gross, JOSPT, 2009

Neck Pain
Ther Ex Interventions



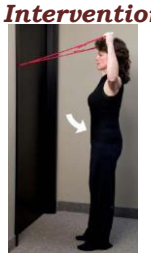
Phase 2 Gross, JOSPT, 2009

Neck Pain
Ther Ex Interventions



Phase 2 Gross, JOSPT, 2009

Neck Pain
Ther Ex Interventions



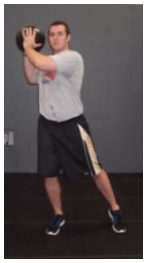
Phase 3 Gross, JOSPT, 2009

Neck Pain
Ther Ex Interventions

Phase 3 Gross, JOSPT, 2009

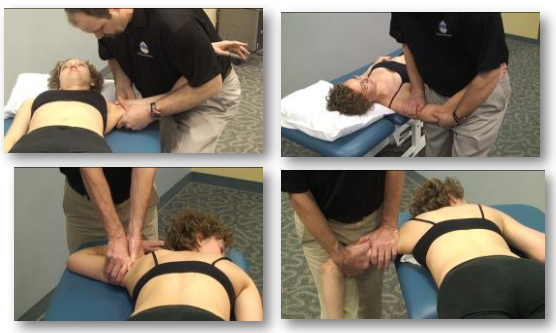
Neck Pain
Ther Ex Interventions

O'Leary JOSPT, 2009



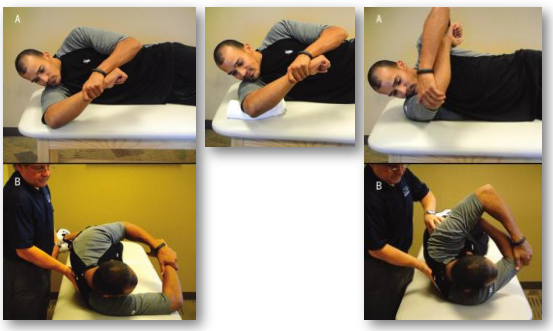
Shoulder
Manual Therapy Interventions

Shoulder
Manual Therapy Interventions



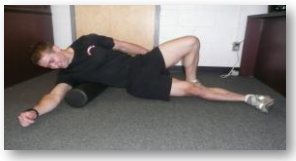
Shoulder
Manual Therapy Interventions

Shoulder
Ther Ex Interventions



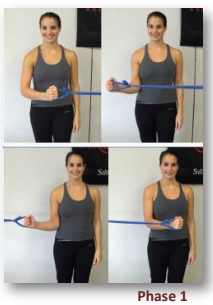
Shoulder
Ther Ex Interventions

Shoulder
Ther Ex Interventions




Shoulder
Ther Ex Interventions


Shoulder
Ther Ex Interventions


Phase 1


Tate, JOSPT, 2010

Shoulder
Ther Ex Interventions

Tate, JOSPT, 2010

Shoulder
Ther Ex Interventions

Tate, JOSPT, 2010

Shoulder
Ther Ex Interventions

Reinold, JOSPT, 2009

Shoulder
Ther Ex Interventions

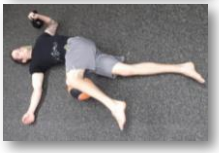
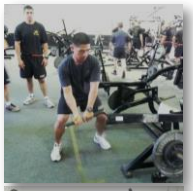
Escamilla & Wilk, w/permission

Shoulder
Ther Ex Interventions

ExuberantAnimal.com

Shoulder
Ther Ex Interventions

Shoulder
Ther Ex Interventions


Hip OA
Manual Therapy Interventions

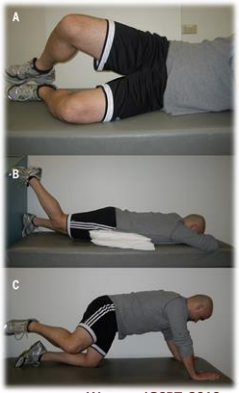



Hip OA
Manual Therapy Interventions




Hip OA
Ther Ex Interventions

Willy, JOSPT, 2011



Wagner, JOSPT, 2010

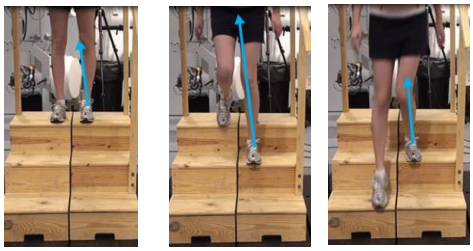
Hip OA
Ther Ex Interventions

Willy, JOSPT, 2011

Knee OA
Manual Therapy Interventions

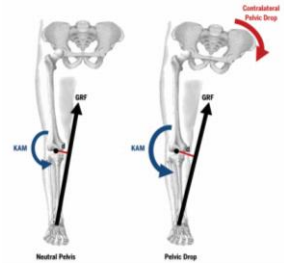
Knee OA
Ther Ex Interventions

Knee OA
Ther Ex Interventions



Farrokhi, JOSPT, 2013

Knee OA
Ther Ex Interventions



Farrokhi, JOSPT, 2013

Knee OA
Ther Ex Interventions





Knee OA
Ther Ex Interventions






Ankle Sprain
Manual Therapy Interventions




Ankle Sprain
Manual Therapy Interventions


Ankle Sprain
Ther Ex Interventions

- Successful programs involve
  - SLS on ***stable and unstable*** surfaces
  - General strengthening
  - Performance of functional activities such as hopping and figure of 8 running
  - Frequency/duration of these programs has been
    - 1 – 5 times per week for 4 - 8 weeks


Ankle Sprain
Ther Ex Interventions

Integrate the kinetic chain

Ankle Sprain
Ther Ex Interventions

Integrate the kinetic chain

198

Ankle Sprain
Ther Ex Interventions

Integrate the kinetic chain

199

Ankle Sprain
Ther Ex Interventions

Return to Sport Activities

200

Summary

- Substantial theoretical and empirical evidence that manual therapy and therapeutic exercise have synergistic effects
- Biopsychosocial model and the evidence suggest that approaches to manual therapy and exercise can be varied

dmcmillian@pugetsound.edu

bboyles@pugetsound.edu