Manual Therapy for Special Populations
Manual Therapy for the Elderly Patient

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Outline of Course
- What we know, thought we knew, and what we don’t know
- Relevant and pertinent biomechanics and neurophysiological benefits
- Contraindications and indications of use of manual therapy with the elderly patient
- Application methods for the elderly patient

Manual Therapy Candidate?
- 83 year old male, bilateral leg pain (7/10) and low back pain (3/10)
- Improves upon sitting
- Worse with walking
- Wide based gait
- Chronic low back pain
- Diminished Achilles reflexes bilaterally

Don’t Do it, Safety First!
Do it, No Problems!

Manual Therapy Candidate?
- 62 Year old Female
- Has 4 of 5 criteria for the lumbar spine clinical prediction rule
- Is healthy and robust (runner)
- Reports midline upper low back pain 5/10 (no leg pain)
- Worse with extension
- BMI = 21
- Minimal kyphosis
- Insidious onset of pain (no trauma)

Don’t Do it, Safety First!
Do it, No Problems!
Manual Therapy Candidate?

- 67 year old male with long term history of stiff neck and OA
- Notes problems with gait
- No LBP, or history off
- You find significantly restricted hips, bilaterally
- No hip pain, just ROM loss

Don't Do it, Safety First!

Part 1: What we know, thought we knew, and what we don't know

Answers Later!

What is Manual Therapy?

Too Many Types of “Manual Therapy”

- Different forms of manipulative therapy available to choose from:
  - Acupressure
  - Acupuncture
  - Bodywork
  - Bone setting
  - Dom Method
  - Joint Manipulation
  - Joint Mobilization
  - Spinal Manipulation
  - Spinal Mobilization
  - Massage Therapy
  - Manual Lymphatic Drainage

- Medical acupuncture
- Muscle energy technique
- Myofascial release
- Naprapathy
- Osteopathic manipulative medicine
- Rolfing
- Setai
- Solai
- Shatsu
- Traction
- Tui Na
CPT Code 97140

- Manual Therapy Techniques (eg. mobilization/manipulation, manual lymphatic drainage, manual traction), one or more regions, each 15 minutes

APTA/AAOMPT Definition

- “Manual therapy techniques consist of a broad group of passive interventions in which physical therapists use their hands to administer skilled movements designed to modulate pain; increase joint range of motion; reduce or eliminate soft tissue swelling; inflammation; or restriction; induce relaxation; improve contractile and noncontractile tissue extensibility; and improve pulmonary function. These interventions involve a variety of techniques, such as the application of graded forces.”


Table 1. Definitions of the Most Common Applications of Orthopedic Manual Therapy.

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<td>Passive technique involving application of a tensile force to tissue in an effort to increase the extensibility of length (and resultant range of motion) of the targeted tissue.</td>
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<td>Mobilization</td>
<td>Passive technique designed to restore full passive joint function by rhythmic, repetitive passive movements, with the patients tolerance, to voluntary and or accessory ranges.</td>
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<td>A manually-assisted method of stretching mobilization where the patient actively aids the therapist, in a single, rapid, and diverse movement of a small amplitude, followed by a slow, stretching of the patient.</td>
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... “There are those out there doing these in the name...”

Manual Therapy Snob?

Common Theme with Respect to Manual Therapy

- It’s complex
- It takes years to master (don’t do it unless you will commit)
- It’s dangerous
- Only the few, the proud....
- It is mystical

Demystification-It’s too Complex

- Many of the theories create this concept of overt complexity
  - Coupling patterns
  - Convex on concave rules
  - Selective tissue tension theories
  - Targeted-specific movements based on arthrokineamatics

It’s Dangerous

- Most manipulation-based injuries and deaths occurred at the hands of a chiropractor, while PTs were involved in fewer than 2% of the injury cases
- No deaths have been attributed to PTs providing cervical spine manipulation.
- Serious or severe complications of lumbar spinal TJM are extremely rare.
- Didactic training with the supervised clinical education experiences, well prepares the new graduate to competently and safely utilize manipulation.

Demystification-It takes too long to learn....

- Even bad manual therapy is useful on the proper candidate!
- Giving nonmaleficence priority over beneficence in clinical decision making results in “therapeutic nihilism.”

It is mystical

White paper on Manipulation, Position on Thruunt Joint Manipulation Provided by Physical Therapists, APTA.org.


Letter to the editors
Therapist as operator or interactor? Moving beyond the technique

It’s not about the technique and it’s time to move beyond that. It’s about the decision making process and the relationship built with the patient during their care.
Specific Myths in using Manual Therapy for the Elderly

Myths in Geriatric Mobilization

- The patient is too fragile (bone mass)
- Their tissue would not tolerate it
- Mobilization is too aggressive
- Mobilization is not effective for the reduction of pain
- Mobilization may make them worse
- Modalities are better at relieving pain than mobilization
- Stretching is safer and more effective

The patient is too fragile (bone mass)

- Direct force on the bone actually increased trabecular network integrity. (Christiansen, 2001)
- The ligaments and their attachments to the bone are actually more fragile than the articular sites (Karakostas, 1999)
- The contact points during correct types of mobilization should be cortical and non-rotary.
- Manipulation, well, that may be a different story

Their tissue would not tolerate it

- Unless the patient has symptoms, tissue limitations are not significant (Jull & Bullock, 1987)
- One will actually see increases in tissue strength through stretch hypertrophy (Goldspink et al, 1995)

Mobilization is too aggressive

- Mobilization with compression was actually better than traction based mobilization to a largely geriatric population (Noel et al, 2000)
- Aggressiveness is highly related to type of application (Thelkeld, 1992)
- Compression based mobilization is especially effective on the hip and shoulder (Maitland, 1986)
- The effects of immobilization are worse (Akeson et al, 1987)

Mobilization is not effective for the reduction of pain

- Wyke, 1985
- Patient's feel less pain for the same amount of force applied (Shrier & Gossal, 2000)
- It effectively reduces pain associated with mechanoreceptor stiffness (Magnusson et al, 1996)
Mobilization may make them worse

• Cook & Hart, 1998
• DiFabio, 1996
• Maitland, 1986
  - In reality most outcome related studies consistently show improvements with mobilization.
  - Additionally, the elderly flock to chiropractors for "mobilization"

Modalities are better at relieving pain than mobilization

• Modalities scored lower than MT and STM on Low Back Outcomes (Cook and Hart, 1997)
• Ultrasound with stretching more effective than US alone or Stretching alone (Wessling et al., 1987)

Additionally, the elderly flock to chiropractors for "mobilization"

- Modalities scored lower than MT and STM on Low Back Outcomes (Cook and Hart, 1997)
- Modalities used with no success is an ethical issue (Levenson & Weissberg, 1983)
- Modalities may gait pain but will not change nociceceptor qualities (Mangoes et al., 1970)

Non-Mechanical Spinal Pain

Table 2. Report during Movements as a Diagnostic Measure for Metastatic Spine Cancer (C-HSUE, 50-113) Study in subjects with metastatic cancer with a concurrent disorder.

<table>
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<th>Movement</th>
<th>Sensitivity (95% CI)</th>
<th>Specificity (95% CI)</th>
<th>Likelihood Ratios (95% CI)</th>
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<td>94 (89-99)</td>
<td>31 (27-32)</td>
<td>1.4 (1.2-1.4)</td>
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<td>43</td>
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<td>94 (89-99)</td>
<td>31 (27-32)</td>
<td>1.4 (1.2-1.4)</td>
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<td>Right Side Flexion</td>
<td>94 (89-99)</td>
<td>31 (27-32)</td>
<td>1.4 (1.2-1.4)</td>
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Note: Five findings are included in the rule: (1) age > 52 years; (2) no presence of leg pain; (3) body mass index < 22; (4) does not exercise regularly; and (5) female gender.


Cervical Myelopathy!

<table>
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<tr>
<th>Clustered Results</th>
<th>Sensitivity (95% CI)</th>
<th>Specificity (95% CI)</th>
<th>Likelihood Ratio (95% CI)</th>
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<td>1 of 5 positive tests</td>
<td>94 (.89-.97)</td>
<td>31 (.27-.32)</td>
<td>1.4 (1.2-1.4)</td>
<td>0.18 (0.12-0.42)</td>
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<tr>
<td>2 of 5 positive tests</td>
<td>94 (.89-.97)</td>
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<tr>
<td>3 of 5 positive tests</td>
<td>94 (.89-.97)</td>
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<td>4 of 5 positive tests</td>
<td>94 (.89-.97)</td>
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Note: Five tests are included in the rule: (1) Gait deviation; (2) +Hoffmann's test; (3) Hyperesthesia of the tracheoesophageal; (4) Babinski test; and (5) age > 45 years. The associated posttest probability values are based on a pretest probability of 35%.

Stretching is safer and more effective

Forces such as the hamstring stretch are upwards of 400 Newton’s (Herzog, 1996)

Realignment of collagen is estimated to be about the force produced during voluntary contraction of a muscle (Irion, 2000).

Most mobilization forces are in the ranges of 30 to 120 total Newtons (Lee & Mosely, 1996)

Compression Fracture!

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<tr>
<td>1 of 5 positive tests</td>
<td>0.03 (.01-.08)</td>
<td>99 (.98-.99)</td>
<td>1.0 (98-100)</td>
<td>Inf (3.9-Inf)</td>
<td>0.91 (0.90-0.92)</td>
<td>98+</td>
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• Part Two: Relevant and Pertinent Biomechanics and Neurophysiological Benefits

**Convex-Concave Rule**
- Only mixed evidence to support this
- Not at the glenohumeral joint
- Not at regions where boney abnormalities are present


**Coupling of the Spine**
- Only consistent region is the lower cervical area
- Inconsistent in thoracic, upper cervical, and lumbar spine
- Should not be used for diagnosis or to steadfastly perform a dedicated treatment technique

**Nerve Biasing and Joint Specific Techniques**
- Nerve biasing techniques are not specific to a single nerve (Kleinrensink et al. 2000)
- Joint specific technique forces are dissipated throughout a large area and are not specific to a given segment (Herzog et al 2001; Ross et al. 2004).


**Manipulation vs. Mobilization C-Spine**
- Different results (>manipulation) (short term)
- Similar results (no conclusive difference) (long term)

**Specificity of Performance**
- The direction of the technique is critically important (No, it makes no difference; Chiradejnant et al. 2003)
- A Therapist selected technique is better than a random technique (No, Chiradejnant et al. 2009; Schomacher 2009; Ferreria et al. 2009)
- A specific type of technique is essential as well (No, Chiradejnant et al. 2003)
Immediate Effects Research

• Immediate effects...it’s a start
• Not all immediate effects result in long-term effects (Coronado 2010; Hegedus 2011)!
• May not equate to functional gains
• Tuttle et al. (2005); Garrison et al. (2009); Wright 2010
• More on this....

So how do we determine who does best with manual therapy?

NO!

How does Manual Therapy work?

• Biomechanical
• Neurophysiological
• Psychological

Biomechanical Changes

• Biomechanical (Improvement in impairment associated with movement)
• Short term mechanical change in vertebral position (Gal et al. 1977)
• Short term mechanical increase in ROM (Mierau et al. 1988)
• A number of studies have demonstrated short-term gains versus controls (Cook et al. 2007)

Neurophysiological

• Spinal Cord Hypoalgesia (Diminished sensitivity to pain)
• Sympathoexcitatory (changes in blood flow, heart rate, skin conductance, and skin temperature)
• Lessening of Temporal Summation (CNS condition, which demonstrates an increase perception of pain to repetitive painful stimuli)
• Peripheral Inflammatory Mediators (Alteration of blood levels of inflammatory mediators)
• Central Mediated (Alterations in pain “experience” in the ACC, amygdala, periaqueductal grey, and rostral ventromedial medulla)
• Muscle Reflexogenic (decrease in hypertonicity of muscles)

**Psychological Changes**

- Placebo (active approach versus nothing)
- Improvements in depression, mental component scores (not fear avoidance scores)
- Expectation (yes for back, no for lower extremities)


**Short Term**

- All neurophysiological effects are 15-20 minutes in duration (as in gone in 20 minutes)
- The effects are the same as multiple other “inert” treatments such as superficial heat, long-wave ultrasound, short-wave diathermy,
- and specific exercises, massage, kinesio-taping, passive physiological movements, acupressure, ischemic compression, simple touch, ice massage, and strain-counterstrain
- Is manipulation/mobilization analogous to


**In Theory....**

- Outcome of “manual therapy” is mediated by improvements in lumbar multifidi recruitment and immediate decrease in global stiffness.
- Both spinal stiffness characteristics and lumbar multifidi recruitment changes appear to play a role.


**????**

- Why do some patients experience carry-over of symptom improvement and others don’t?
- Is the secret in the home program?
- Do other mechanisms do something similar (neurophysiologically) to manipulation?
- Can the biomechanical elements occur using a different source of intervention?

**Two Main Themes**

- Rule out those that are contraindicated or that may worsen
- Rule in those who will benefit and effectively measure that benefit

**Part Three: Contraindications and Indications of Use of Manual Therapy on the Elderly**
Contraindication?

Contraindications Pertinent to the Elderly

- **Absolute**
  - Malignancy
  - Cauda Equina
  - Fracture
  - Gross Spondylolisthesis
  - Psychological disorder

- **Relative**
  - Osteoporosis
  - Neurological deterioration
  - Acute radiculopathy
  - Long term corticosteroid use
  - Blood clotting disorder

Rule In who Benefits

- Pain and Stiffness (intuitive)
- CPR
- Patient Response Method

Clinical Prediction Rule

- 1) Duration of symptoms < 16 days
- 2) Hip internal rotation of at least 35 degrees
- 3) Lumbar segmental hypomobility tested with a spring test
- 4) No symptoms distal to the knee
- 5) Score of < 19 on the work subscale of the Fear-Avoidance Beliefs Questionnaire

Four of 5 of these findings increases the odds of a short term positive response from manipulation by 25 fold and demonstrated better outcomes than exercises


Not Specific to Older Patients

- 141 patients (49% female, mean age = 35.5 (+/- 11.1) years) participated.
- Low Prevalence anyway (Stanton et al. 2011; Werneke et al. JMMT 2010)

And there aren’t any validated for any other body regions that are specific to the older population.

If I don’t follow a CPR and I’m not Intuitive, what should we do?

- Use the patient response method (if movement helps in the examination, move them)

Part Four: Application Methods for the Elderly Patient

Primary Impairments

- Loss of range of motion of the hips
- Loss of range of motion of the neck
- Loss of mobility of the back
- Loss of dorsiflexion of the ankle
- Loss of extension of the thoracic spine
- Loss of mobility in the shoulder
- Dowagers hump
- Loss of terminal knee extension