TREATING THE THORACIC SPINE: AN EVIDENCE-BASED APPROACH

Scott Lawrance

Clinical Associate Professor

Purdue University

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OBJECTIVES

1. Demonstrate the importance of thoracic spine mobility and relate how a lack of motion can affect function throughout the spine and upper kinetic chain.
2. Analyze thoracic spine mobility and classify differences in spinal versus segmental motion loss to determine a therapeutic intervention.
3. Apply static and dynamic thoracic spine joint mobilizations to improve range of motion.
4. Build a therapeutic exercise program to maximize the manual therapy intervention.

DEFINING THE PROBLEM

- Thoracic spine and rib pain is often thought to be self-limiting in nature[1,2]
- Thoracic spine serves as region of force transmission, transferring load between lower and upper extremities[1-4]
- Due to the proximity of the thoracic spine to the cervical, lumbar, and shoulder regions, dysfunction in the thoracic spine can influence pain, mobility, and stability across these areas[1-3,5-7]

DEFINING THE PROBLEM

- Thoracic kythosis and hypomobility is common deficit[11,15-18]
  - Prolonged sitting posture
  - Front side training dominance/preference
- Thoracic spine immobility can contribute to many different problems
  - Difficulty/painful rotation
  - Lumbar spine or cervical spine pain
  - Shoulder pain/limited mobility

Image from: http://www.washingtonarthritisrheumors.com/wp-content/uploads/2016/12/desk.jpg

NORMAL MOVEMENT ASSESSMENT

- Accepted normative physiological motion values:[8-10]
  - Flexion: 20° to 45°
  - Extension: 25° to 45°
  - Sidebending: 20° to 40°
  - Rotation: 35° to 60°
- Passive Intervertebral Movement (PIVM):[11-14]
  - Segmental assessment technique to determine how each vertebrae moves on another

CLINICAL QUESTION 1

- *Is gross spinal motion analysis or segmental spinal motion analysis a more accurate measure to identify mobility deficits in active adults with pain?*

P	Active adults
I	Gross Spinal Motion OR Spine Goniometry
C	Segmental Spinal Motion OR PIVM
O	Loss of motion OR Decreased mobility

CLINICAL QUESTION 1

- Goniometry[19-21]
  - Poor to fair inter-rater reliability
  - Fair to good intra-rater reliability

- PIVM[14,22-24]
  - Poor to fair inter-rater reliability
  - Fair to good intra-rater reliability

GROSS MOBILITY ASSESSMENT

- Thoracic spine mobility
  - **Note:** Quality of motion, Amount of motion, Degree of rotation, Mechanical symptoms, Diminishment or exaggeration of spinal curves

SEGMENTAL MOBILITY ASSESSMENT

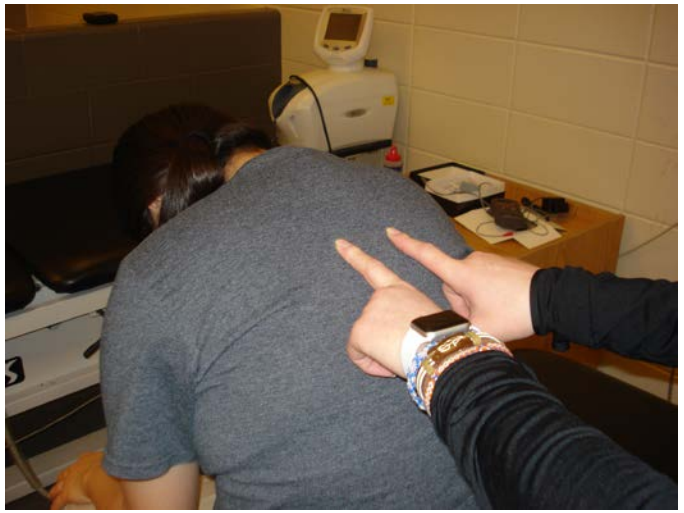
- PIVMs
  - Passively flex/extend the trunk
  - Feel for restricted inter-spinous process movement
  - Used to judge local movement and classify as hypermobile, normal, or hypomobile

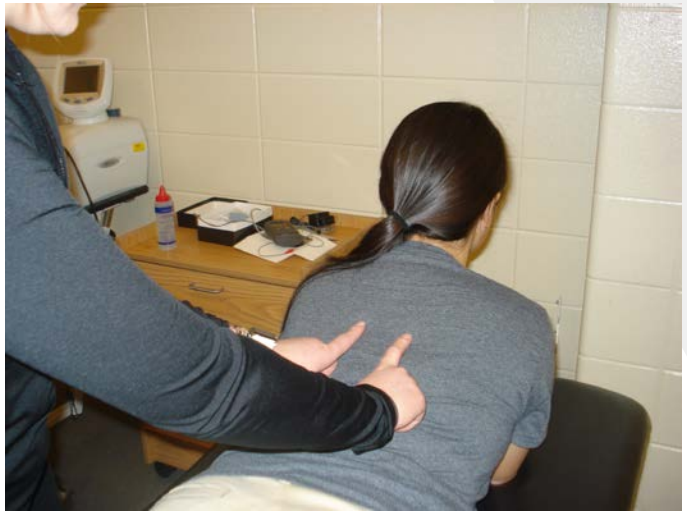
SEGMENTAL MOBILITY ASSESSMENT

- Spring Testing
  - Hypermobile
  - Normal
  - Hypomobility

SEGMENTAL MOBILITY ASSESSMENT

- Positional palpation
  - Flexed, neutral, and extended position
  - Is the segment neutral vs. rotated to the right or the left





RIB MOBILITY ASSESSMENT

- Rib mobility will play a role in thoracic mobility
- Must answer which is the dysfunctional segment?
- Rib motion review:
  - Pump handle
  - Bucket handle
  - Caliper

LAB

- Work with a partner or in a small group to assess thoracic spine mobility
  - Can you identify areas of decreased mobility grossly?
    - Gross ROM
  - Can you identify areas of decreased mobility segmentally?
    - PIVMs
    - Segmental PAs
    - Positional palpation
  - Can you identify areas of decreased rib cage mobility?
    - Upper ribs, middle ribs, lower ribs

CLINICAL QUESTION 2

- *In patients who lack thoracic spine mobility, are manual therapy mobilizations, alone, as effective as manual therapy mobilizations in combination with soft tissue stretching for improving patient function?*

P	**Active adults**
I	Joint Mobilization
C	Joint Mobilization with Stretching
O	Improved function OR Improved mobility

CLINICAL QUESTION 2

- Several high quality studies support the use of manipulation[26-28,31,32,34,35]
  - Increased GROC
  - Decreased SANE
  - Improved Neck Disability Index, Oswestry, and DASH scores
- Is manipulation allowed in your practice act?
- What is the role of evidence in our current educational reform and curricular design?

CLINICAL QUESTION 2

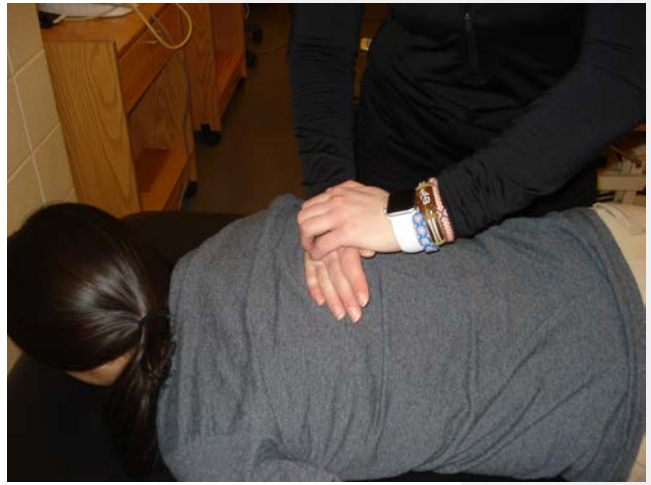
- Manual therapy interventions can lead to a decrease in pain and improvement in function in the thoracic spine and adjacent regions[25-35]

- Combination of manual therapy and exercise improved thoracic spine pain reported[36-40]

- Optimal interventions for the management of primary thoracic pain have yet to be determined

STATIC MOBILIZATION

- Mostly *low-level* evidence to support the use of mobalization[29,33,36,39]
- Manipulation > Mobilization
- PA glides
- PA rotational glides



DYNAMIC MOBILIZATION

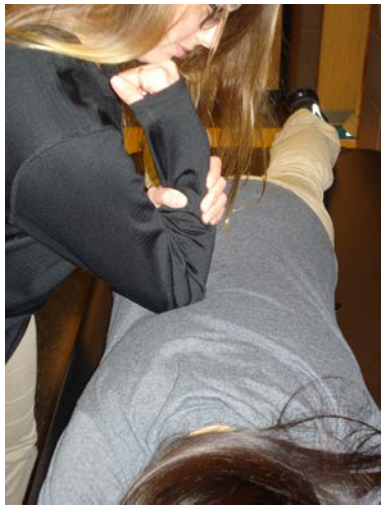
- Mulligan Mobilization with Movement[41]

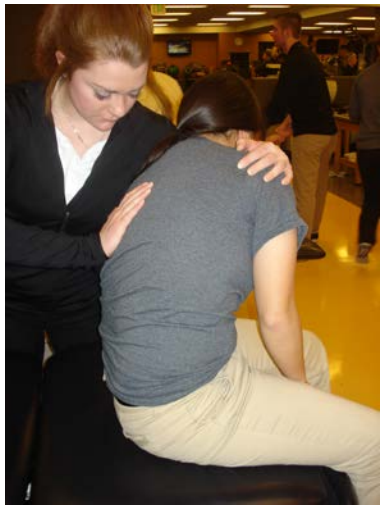
MUSCLE ENERGY[42,43]

- Group dysfunctions (Type I) involve 3 or more segments in a row
  - Dysfunction is usually due to a long muscle crossing the area: quadratus lumborum, latissimus dorsi, erector spinae
- Segment dysfunctions (Type II) involve a single vertebral unit
  - Most commonly seen

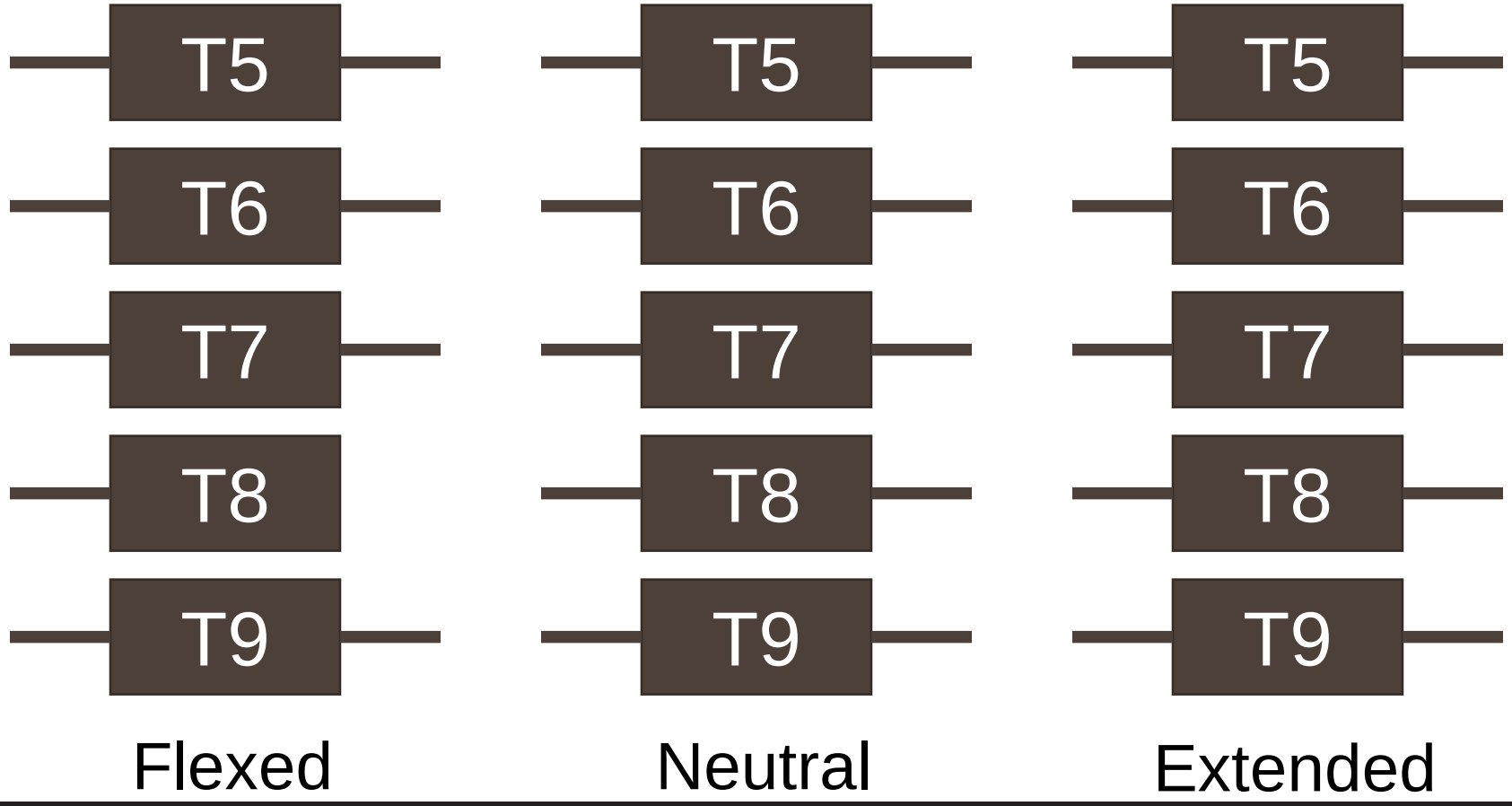
MUSCLE ENERGY: GROUP VERSUS SEGMENT DYSFUNCTION

- Group dysfunctions treated with mobility exercises and other manual therapies
- Segmental dysfunctions treated with Muscle Energy

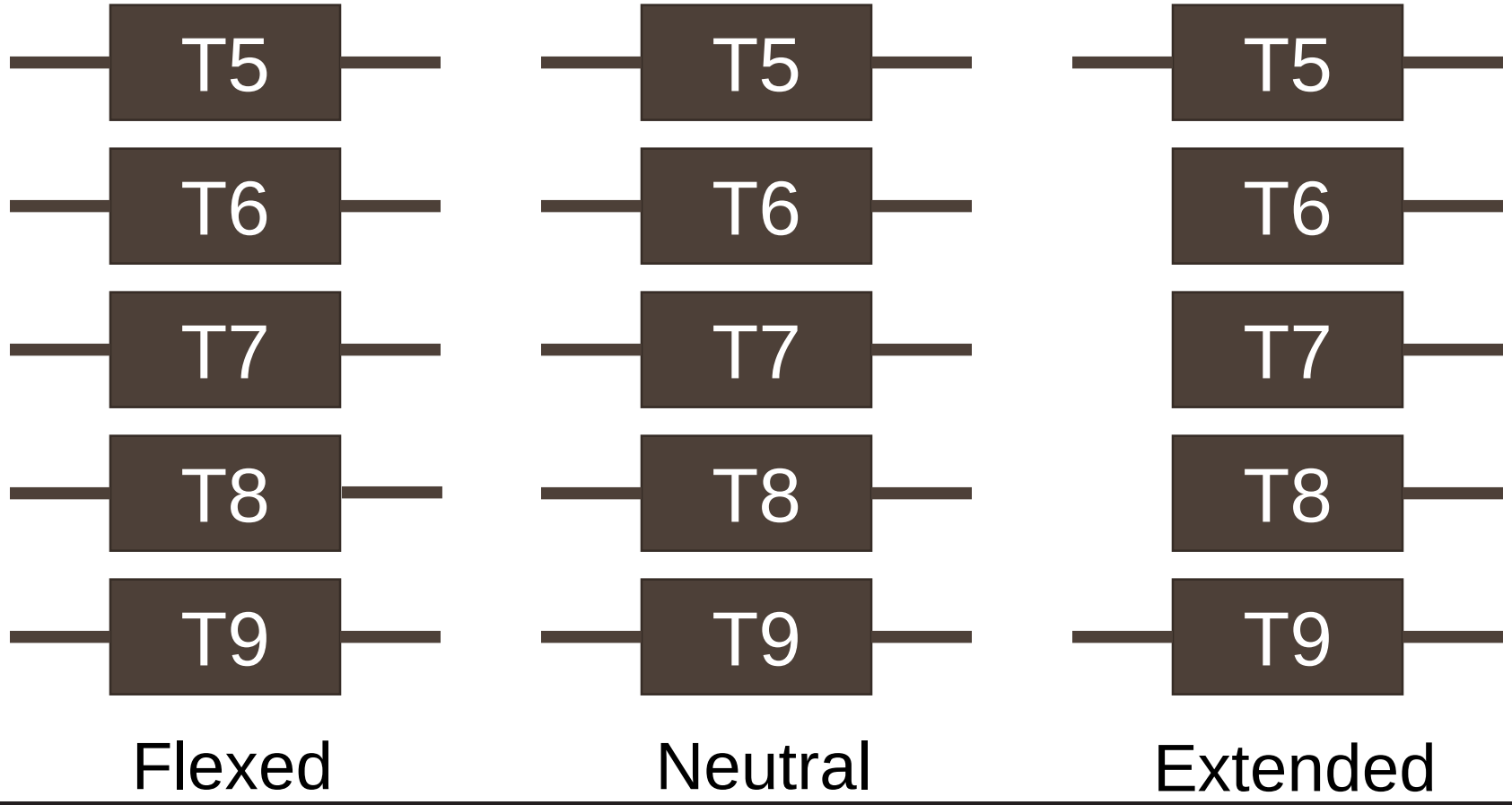




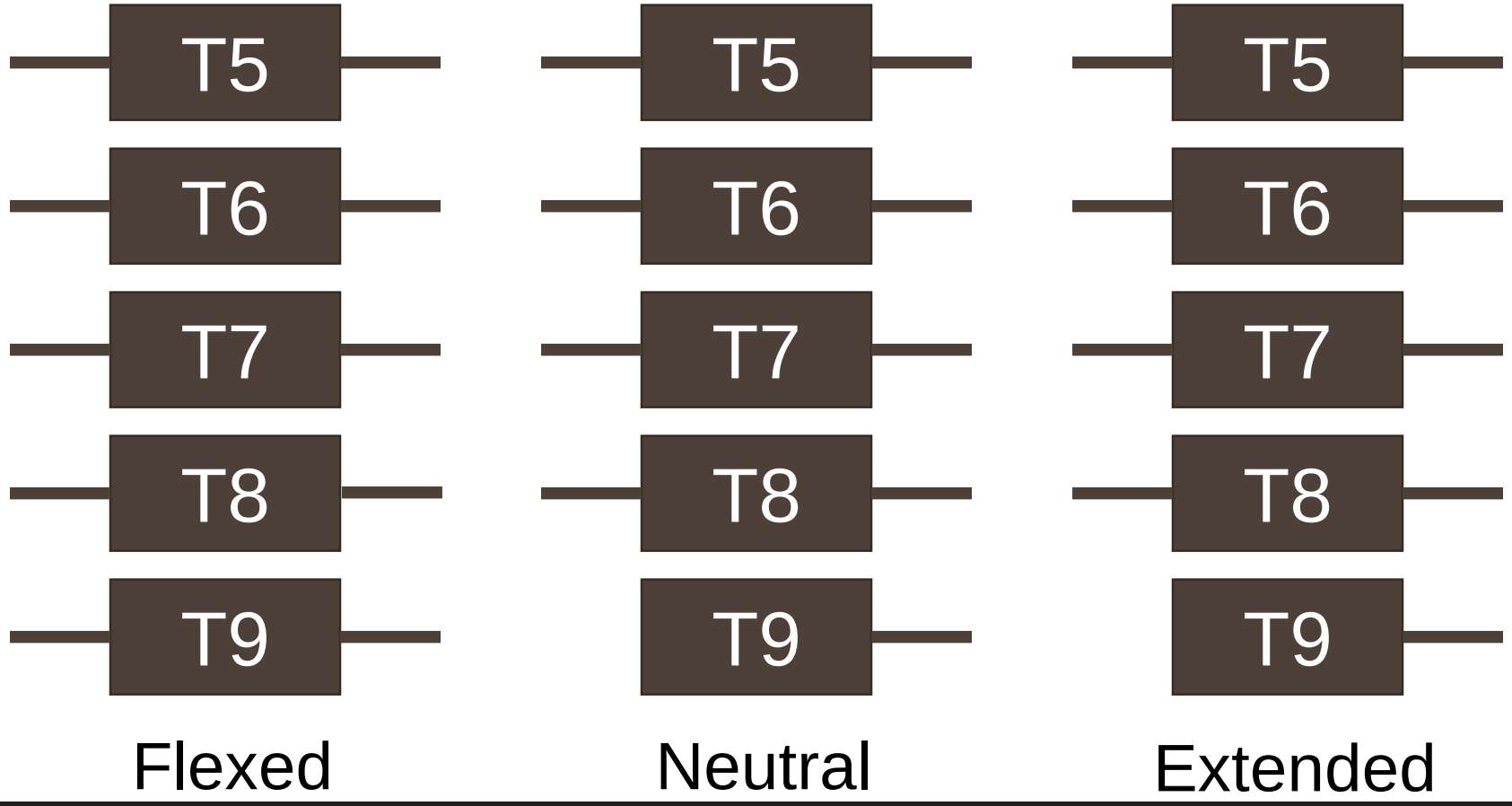
SEGMENTAL ASSESSMENT EXAMPLE #1



SEGMENTAL ASSESSMENT EXAMPLE #2

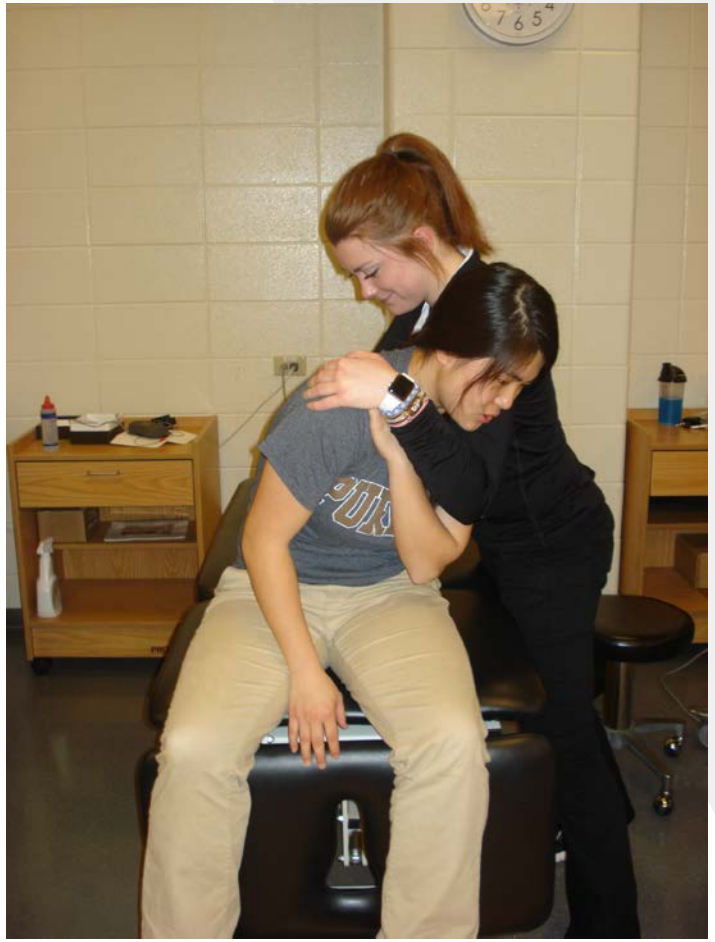


SEGMENTAL ASSESSMENT EXAMPLE #3



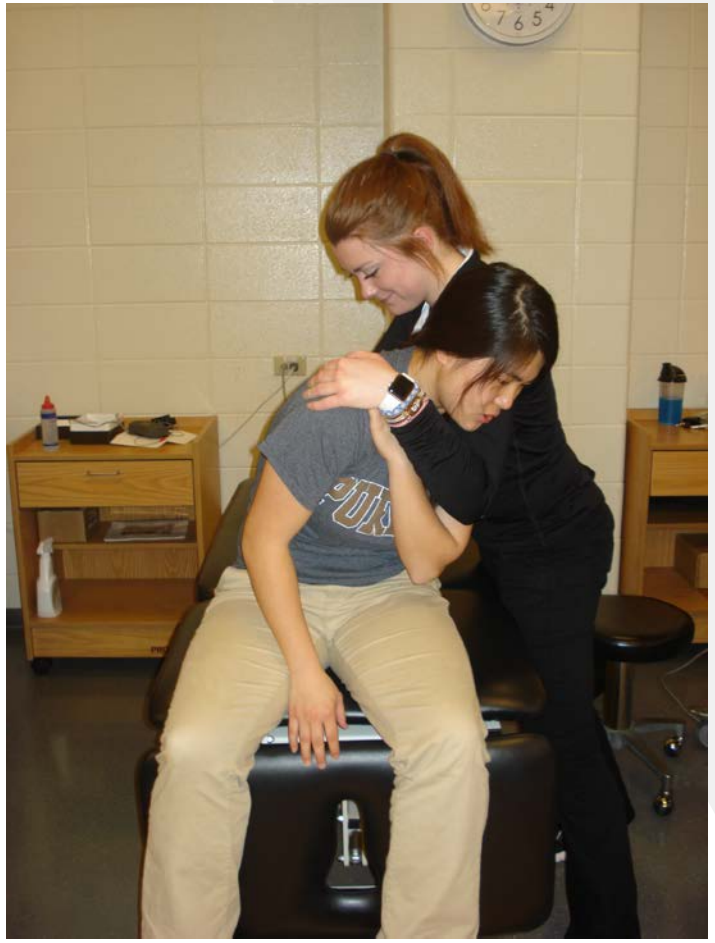
TREATING TYPE II DYSFUNCTIONS

- Patient positioning
  - Place them in a seated position with legs off the end of table
  - Stand to the side of the patient where you are going to sidebend them toward
  - Patient will cross that arm over their chest



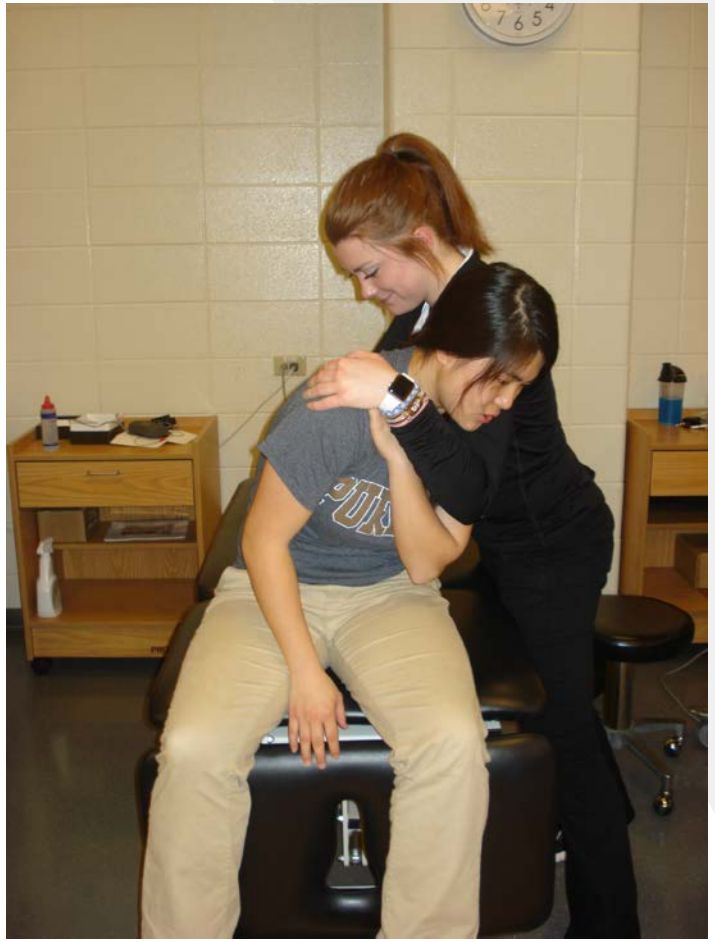
TREATING TYPE II DYSFUNCTIONS

- Finding the barrier (1 of 2)
  - The trunk is flexed or extended until motion is felt in the involved segment
    - If the prominent transverse process was found in **flexion**, the trunk should be **extended** until the segment moves
    - If the prominent transverse process was found in **extension**, the trunk should be **flexed** until the segment moves



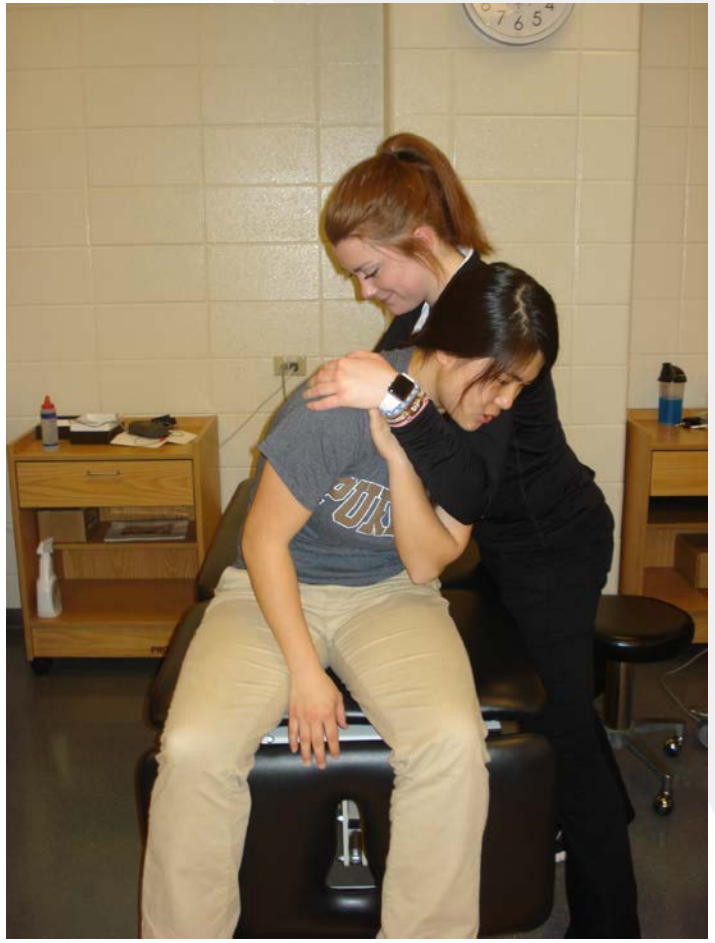
TREATING TYPE II DYSFUNCTIONS

- Finding the barrier (2 of 2)
  - Maintain trunk flexion or extension while moving the patient into sidebending until the segment you are monitoring moves
  - Maintaining this position, add passive rotation into you until you once again feel the segment start to move



TREATING TYPE II DYSFUNCTION

- Treatment
  - Patient actively tries to rotate back toward a neutral position while examiner holds position
    - Minimal force is needed
    - Contraction held for 3-5 seconds
    - Examiner “re-establishes” the barrier with further rotation
    - A total of 3 contractions are performed
    - Be sure not to rush the treatment → time must be allowed for musculature to relax



TREATING TYPE II DYSFUNCTION

- Re-assess
  - Segmental motion
  - Gross motion (comparable sign)

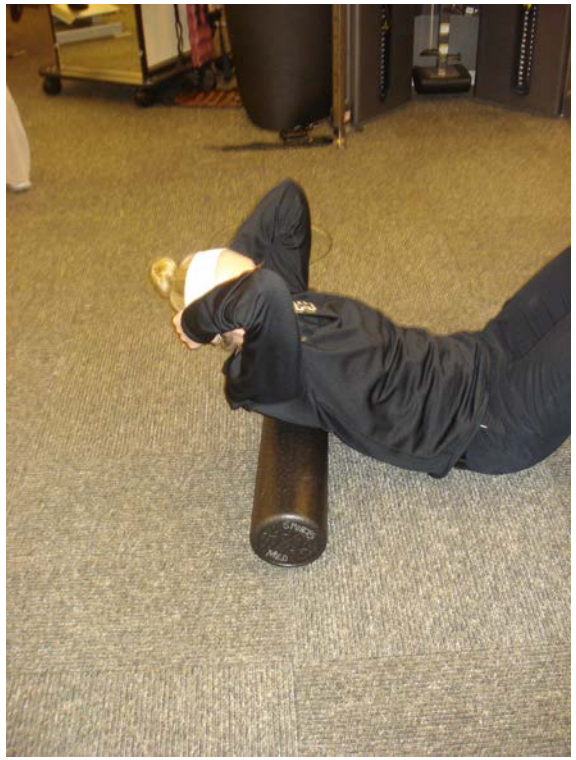
LAB

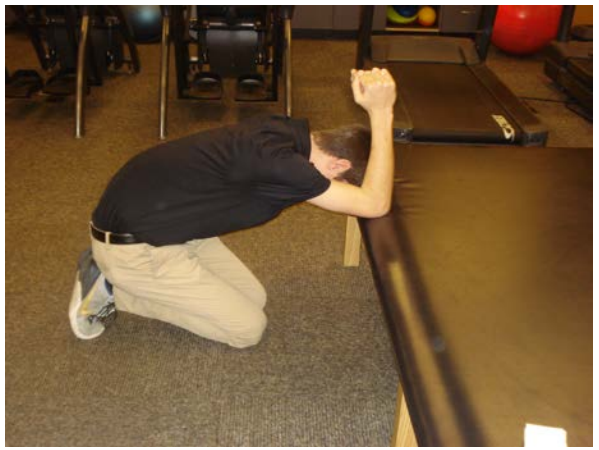
- Work with a partner or in a small group to treat thoracic spine mobility
  - Practice segmental static mobilizations
    - PA
    - PA rotational
  - Practice MWM dynamic mobilizations
    - Flexion
    - Extension
    - Rotational
  - Try muscle energy segmental positioning

THERAPEUTIC MOBILITY EXERCISE

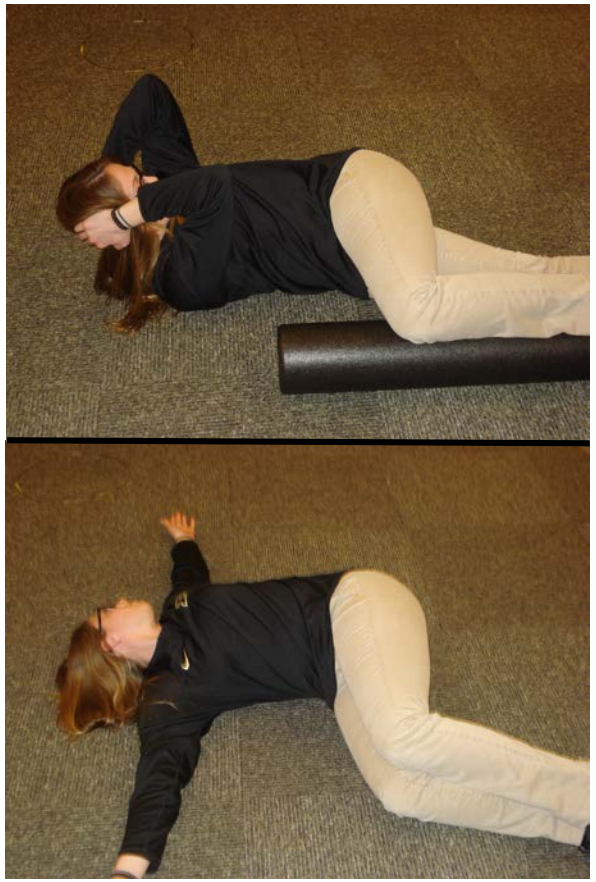
- Proliferation of corrective exercises targeting thoracic spine in last 5-10 years
- Case studies have been published on effectiveness of exercise to improve thoracic mobility[2,36,39]

THERAPEUTIC EXERCISE FOR FLEXION/EXTENSION





THERAPEUTIC EXERCISE FOR ROTATION



CLINICAL BOTTOM LINE

- Assessment of motion is clinician dependent
- Manipulation has demonstrated the best outcomes
- Manual therapy in conjunction with exercise is effective
- No evidence on exercise alone to treat mobility

QUESTIONS?

Scott Lawrance, DHSc, LAT, ATC, MSPT, CSCS
Purdue University
800 W University Drive
West Lafayette, IN 47907
(765) 496-0502
slawranc@purdue.edu
@SELawrance

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