From Universal to Particular: Applying Clinical Patterns and CPGs to Lumbar Spine Management

Using Clinical Patterns and CPGs to Guide Diagnosis and Treatment

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Disclosure Information

- NHMI Fall symposium
- I have no relevant financial relationships to disclose
- I will not discuss off label use or investigational use in my presentation

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Objectives

1. Apply Movement System Diagnoses to classify Low back pain based on functional patterns, not just structural findings.
2. Use Clinical Reasoning and CPGs (Clinical Practice Guidelines) to choose appropriate interventions for each classification of LBP
3. Assess Irritability and Behavioral Factors to guide personalized intervention strategies and improve outcomes

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Rethinking Spine Diagnosis in PT

- Imaging often poor at correlating with symptoms (e.g., disc bulges in asymptomatic individuals)
- Pathoanatomy does not always guide care
- Functional patterns and irritability better guide for treatment

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Why Imaging alone isn't enough

- **MRIs often show "abnormal" findings in people without pain**
- **Back pain rarely comes from one structure**
- **CPG notes: Any innervated structure (muscles, ligaments, joints, nerve roots) can contribute to LBP**

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When to Refer for Imaging

- **Clusters of red flags**
  - E.g., cancer history + age >50 + no improvement
- **Severe, progressive neurological deficits**
- **Avoid routine imaging unless red flags are present**

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When Pathoanatomic diagnosis guides treatment

- Cauda equina, progressive neuro loss
- Fracture, infection, malignancy
- Post-op protocols
- Always screen first

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Why We Use a Classification Approach

- **Not all back pain behaves the same**
  - **Treating it as one condition= poor outcomes**
- **Matching patients to subgroups improves success rates**
- **Focus on functional movement-based categories rather than structural labels**

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Key takeaways:

- Functional movement patterns and irritability are **better guides for treatment**
- Imaging is **not reliable** for pinpointing cause of LBP
- **Pathoanatomic still matters in red flags & post op**
- **Focus on a treatment-based classification approach (Movement System Diagnosis)**

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Clinical Reasoning should consider

- patient-centered care
- red flag screening
- selective imaging
- physical exam
- Education
- Exercise
- manual therapy as adjunct
- Goal to return to work

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Clinical Reasoning Framework

Pathoanatomy alone often provides limited clarity on where Physical Therapy interventions fits. In contrast, a movement system diagnosis offers a more precise framework to guide intervention.

Use SINSS (Severity, Irritability, Nature, Stage, Stability) to guide interventions.

Classification-based approach improves outcomes and safety.

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Evidence-Informed Decision-Making

Look at recommended vs. non-recommended treatments → Check when to use each treatment (acute, subacute, chronic)

Evaluate strength of evidence: A (strong) to F (weak/theoretical)

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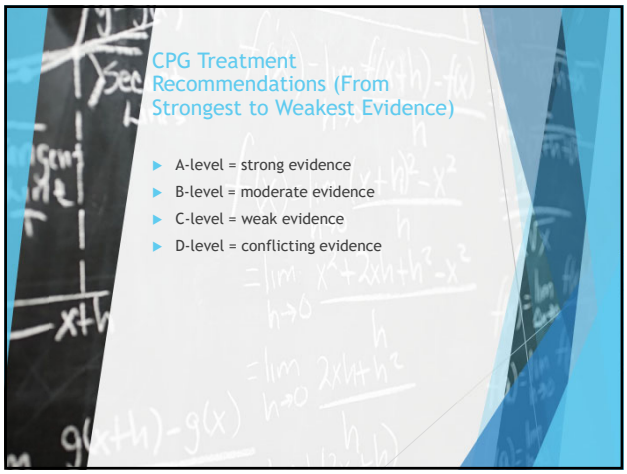
CPG Treatment Recommendations (From Strongest to Weakest Evidence)
A-level = strong evidence
B-level = moderate evidence
C-level = weak evidence
D-level = conflicting evidence

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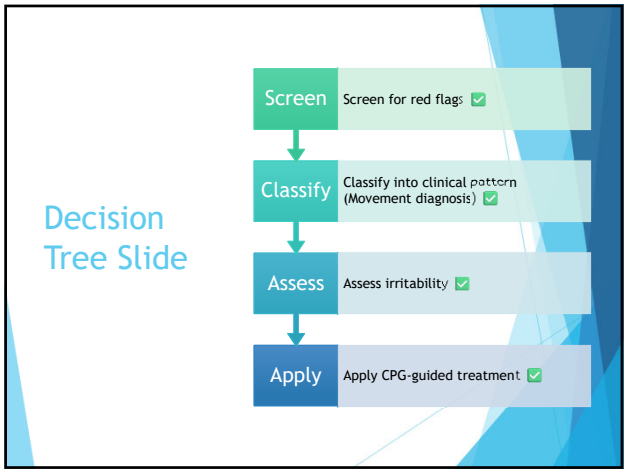
Decision Tree Slide
Screen
Screen for red flags
Classify
Classify into clinical pattern (Movement diagnosis)
Assess
Assess irritability
Apply
Apply CPG-guided treatment

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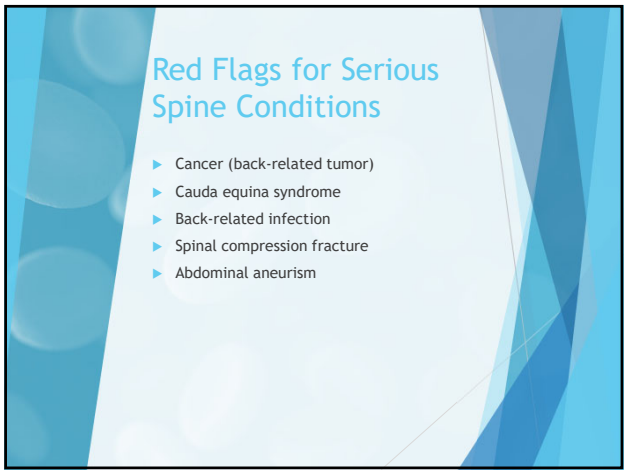
Red Flags for Serious Spine Conditions
Cancer (back-related tumor)
Cauda equina syndrome
Back-related infection
Spinal compression fracture
Abdominal aneurism

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Movement System Categories

Low Back	• Low Back Pain with Mobility Deficits
Low Back	• Low Back Pain with Movement Coordination Impairments
Low Back	• Low Back Pain with Related (Referred) Lower Extremity Pain
Low Back	• Low Back Pain with Radiating Pain
Low Back	• Low Back Pain with Related Cognitive or Affective Tendencies
Low Back	• Low Back Pain with Generalized Pain

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Movement System Category	Clinical Characteristics	Movement/Pain Relation	Recommended Interventions	Example Interventions by Stage	Example Medical Diagnosis
LBP with Mobility Deficits	Unilateral low back pain; limited ROM; segmental mobility restriction	Pain at end-range spinal motions; segmental restrictions	Manual therapy (thrust/non-thrust), mobility exercises, patient education, active exercise	Acute: manipulation/mobility Subacute: flexibility Chronic: strength + endurance	Facet joint syndrome, segmental hypomobility
LBP with Movement Coordination Impairments	Recurring pain; poor control or endurance of trunk/pelvic muscles	Acute: initial/mid-range painChronic: sustained end-range pain	Neuromuscular re-education, stabilization, proprioceptive training, endurance exercises	Acute: motor control and bracing Subacute: coordination in function Chronic: endurance tasks	Lumbar instability, postpartum pelvic girdle pain
LBP with Related/Referred LE Pain	Pain referred to buttock/thigh; centralizes with specific movements	Pain provoked with flexion; improved with extension	Directional preference exercises (e.g., repeated movements), traction when appropriate	Acute: repeated movements to centralize Chronic: strengthening + postural re-education	Discogenic referred pain, flexion syndrome
LBP with Cognitive or Affective Tendencies	Maladaptive beliefs, fear-avoidance, emotional amplification of pain	Pain not always movement-induced; driven by beliefs or fear	Education on pain science, graded activity, cognitive-behavioral strategies	Behavioral education, activity pacing, fear avoidance reduction strategies	Chronic low back pain with kinesiophobia
LBP with Generalized Pain	Diffuse, non-mechanical chronic pain not linked to movement patterns	Pain not clearly related to mechanical movement	Low-intensity aerobic conditioning, CBT-informed education, multidisciplinary care	Graded exposure, non-provocative movement, psychological support	Fibromyalgia, nonspecific chronic low back pain

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Low Back Pain with Mobility Deficits

- Symptoms
  - Acute or subacute onset of unilateral Low back, buttock or thigh pain
  - Pain aggravated by movement, especially at the end range
- Clinical impairments
  - Restricted lumbar ROM and segmental mobility
  - Reproduction of symptoms with segmental provocation
- Treatments
  - Manual Therapy: Thrust and non-thrust technique to improve mobility
  - Mobility exercises to increase spine ROM
  - Patient education on active movement and exercise

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Low Back Pain with Movement Coordination Impairments

- Symptoms
  - Recurring LBP, often referred lower extremity pain
  - Symptoms aggravated by movement or prolonged postures
- Clinical impairments
  - Poor movement coordination of the lumbopelvic region
  - Lumbar segmental hypermobility and reduced trunk or pelvic strength/endurance
- Treatments
  - Trunk coordination, strengthening, and endurance exercises
  - Neuromuscular reeducation for proper lumbopelvic control
  - Functional training focused on safe movement patterns

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Low Back Pain with Radiating Pain/Low Back Pain with Related Lower Extremity Pain

- Symptoms
  - LBP with radiating pain into LE
  - Pain worsens with flexion activities and sitting
  - Potential numbness, tingling, or weakness in a dermatomal pattern
- Clinical impairments
  - Centralization of pain with repeated movements or manual techniques
  - Positive LLTT (SLR, Slump)
  - Sensory, strength, and reflex deficits
- Treatments
  - Exercises to promote centralization (directional preference)
  - PT edu on pain and activity modification
  - Manual therapy to promote extension and postural correction

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Low Back Pain with Related Cognitive or Affective Tendencies

- Symptoms
  - Pain influenced by fear, anxiety, depression, or catastrophic thinking
  - Poor coping strategies and excessive focus on symptoms
- Clinical impairments
  - High scores on psychological assessments (FABQ)
- Treatment
  - Pt edu focusing on neuroscience of pain, coping strategies
  - Graded exercises and exposure to reduce fear and promote activity
  - Cognitive-behavior therapy

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Low Back Pain with Generalized Pain

- Symptoms
  - Chronic, widespread pain not localized
- Clinical impairments
  - Presence of central sensitization and poor pain modulation
  - Emotional factors such as depression or anxiety
- Treatments
  - Low intensity endurance exercise for pain management
  - Pt edu emphasizing the favorable prognosis of chronic pain
  - Multidisciplinary approaches

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Clinical Pearls

Red flags first: cancer, fracture, infection, cauda equina.

Repeated movement testing often more predictive than imaging.

Use classification: mobility deficits, coordination impairments, related leg pain, etc.

Irritability drives decision-making more than structure.

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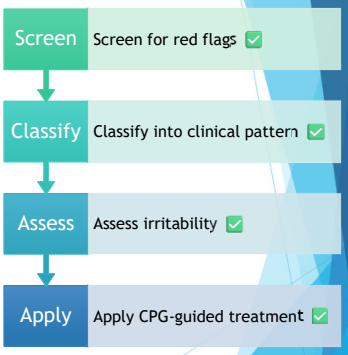
Decision Tree Slide



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Tissue Irritability in the Spine

- High: Acute, low movement tolerance - protect and relieve symptoms
- Moderate: Some tolerance to ADLs - graded movement
- Low: Minimal symptoms - restore function, strengthen
- Treatment pacing must reflect irritability, not diagnosis

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Alrwaily rehabilitation Subgroups

TBC Classification	Primary Focus
Symptom Modulation	Pain control techniques & manual therapy
Movement Control	Exercises targeting motor control & biomechanics
Functional Optimization	Strength, endurance, and functional training

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Decision Tree Slide

- Screen: Screen for red flags ☑
- Classify: Classify into clinical pattern ☑
- Assess: Assess irritability ☑
- Apply: Apply CPG-guided treatment ☑

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How to Read the CPG's Treatment Recommendations

- **Focus on 3 things:**
  1. Which treatments are recommended (and which are not)
  2. When they're recommended (acute, subacute, chronic)
  3. How strong the supporting evidence is
- **Evidence grading (A–F):**
  - **A:** Strong (multiple high-quality studies)
  - **B:** Moderate (1 strong RCT or several weaker trials)
  - **C:** Weak (limited or low-quality studies)
  - **D:** Conflicting (mixed/inconclusive findings)
  - **E:** Theoretical (basic science, models)
  - **F:** Expert opinion (clinical experience)
- **Important reminder:**
  - An **A** = lots of strong evidence, not "always use"
  - An **F** = little evidence, not "never use"

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Condition / Subgroup	Treatment Recommendation	Grade	Notes
Acute LBP	Specific trunk muscle activation exercise	C	May be used; evidence is limited
Acute LBP with Leg Pain	Trunk strengthening/endurance + specific trunk muscle activation	B	Can reduce pain & disability
Chronic LBP	Trunk strengthening & endurance, multimodal exercise, specific trunk activation, aerobic, aquatic, general exercise	A	Strong evidence, core of management
	Movement control or trunk mobility exercise	B	Optional
Chronic LBP with Leg Pain	Specific trunk activation + movement control	B	Evidence moderate
Chronic LBP with Movement Control Impairment	Specific trunk activation + movement control	A	Strong evidence
Chronic LBP in Older Adults	General exercise training	A	Strong evidence
Postoperative LBP	General exercise training	C	Can be considered
Manual Therapy - Acute LBP	Thrust or non-thrust mobilization	A	Strong evidence
	Massage/soft tissue mobilization (short-term relief)	B	Adjunct only
Manual Therapy - Chronic LBP	Thrust or non-thrust mobilization	A	Strong evidence
	Joint mobilization for chronic LBP w/ leg pain	B	Moderate
	Soft tissue mobilization or massage with other treatments	B	Short-term
	Dry needling (adjunct)	C	Short-term only
	Neural mobilization (adjunct, chronic LBP w/ leg pain)	B	Short-term
	Mechanical traction	D	Should not be used
Classification Systems - Acute LBP	Treatment-based classification (TBC)	B	May reduce pain/disability
	Mechanical Diagnosis & Therapy (MDT)	C	Weak evidence
Classification Systems - Chronic LBP	MDT, prognostic risk stratification, or pathoanatomic classification	B	Moderate
	TBC, cognitive functional therapy, or movement system impairment	C	Weak
Education - Acute LBP	Active education (self-management, pacing, staying active, favorable prognosis)	B	Active > passive materials
Education - Chronic LBP	Standard education (advice, activity) but not stand-alone	B	Must be paired with active care
	Pain neuroscience education + exercise/manual therapy	A	Strong evidence
	Active treatments (yoga, Pilates, stretching, strengthening) > education alone	A	Strong evidence
Education - Postoperative LBP	General education (precautions, exercise, resuming activity)	B	Applies to discectomy/decompression

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Intervention recommendations base on 2021 CPG

- 2021 CPG *clearly recommends* exercise as primary, manual therapy as adjunct
- Acute LBP:
  - B: Treatment-Based Classification (TBC)
  - C: Mechanical Diagnosis & Therapy (MDT/McKenzie)
- Chronic LBP:
  - B: MDT, Prognostic risk stratification, Pathoanatomic classification
  - C: TBC, Cognitive Functional Therapy, Movement System Impairment
- **No single classification system proven superior**

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Exercise Recommendations

- Acute LBP- Specific trunk muscle activation (Grade C)
- Acute LBP with Leg Pain- Strengthening + trunk activation (Grade B)
- Chronic LBP- Strengthening, endurance, multimodal, aerobic, aquatic, general exercise (Grade A)
- Chronic LBP in Older Adults- General exercise training (Grade A)
- Chronic LBP with Leg Pain- Specific trunk activation + movement control (Grade B)
- Movement Control Impairment- Trunk activation + movement control (Grade A)
- Post-op LBP- General exercise (Grade C)

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Manual Therapy Recommendations

- Acute LBP-Thrust or non-thrust mobilization (Grade A)
- Chronic LBP-Thrust or non-thrust mobilization (Grade A)
- Massage / STM (short-term relief) (Grade B)
- Dry needling as adjunct (Grade C)
- Neural mobilization for leg pain (Grade B)
- Do NOT use mechanical traction (Grade D)

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Education Recommendations

- Acute LBP- Active education (self-management, favorable prognosis) (Grade B)
- Chronic LBP
  - Pain neuroscience education + exercise/manual therapy (Grade A)
  - Standard education (not stand-alone) (Grade B)
  - Active treatments (yoga, Pilates, strengthening) > education alone (Grade A)
- Post-op LBP-General education (precautions, return to activity) (Grade B)

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Key Takeaways & Clinical Pearls

- Exercise is **first-line** for acute, chronic, and post-op LBP care
- Manual therapy is **adjunctive**, best when combined with active care
- Education should be **active, specific, and not passive**
- **Treatment-based classification (TBC; Alrwaily)** is accessible and clinically aligned
- Use **multimodal approaches** for chronic pain
- **Avoid mechanical traction**
- Consider **dry needling** or **neural mobilization** only as adjuncts (short-term)
- **Post-op (discectomy/decompression):**
- Grade B: Pre-op education preferred (precautions, activity resumption)

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Why Early, Guideline-Adherent PT Matters

- **Study:** Childs et al. (2015) examined >120,000 patients with low back pain.
- **Comparison groups:**
  - **Early PT (within 14 days) vs delayed PT (>14 days)**
  - **Guideline (followed CPG) PT vs Non-adherent PT**
- **Outcomes**
  - Decreased advanced imaging
  - Decreased spinal injections
  - Decreased opioid use
  - Decrease offs of surgery
  - Decreased total healthcare cost

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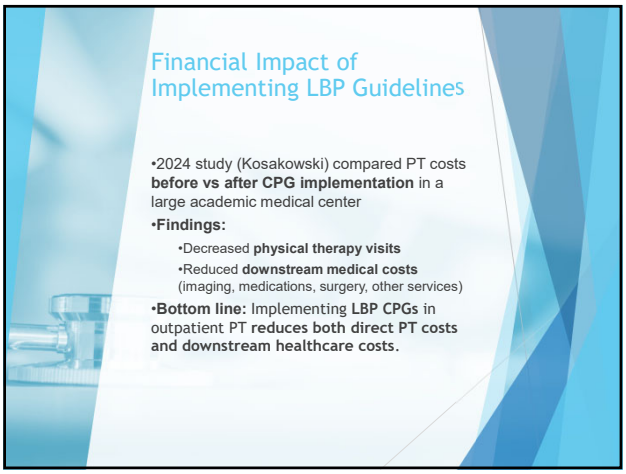
Financial Impact of Implementing LBP Guidelines



- 2024 study (Kosakowski) compared PT costs **before vs after CPG implementation** in a large academic medical center
- **Findings:**
  - Decreased **physical therapy visits**
  - Reduced **downstream medical costs** (imaging, medications, surgery, other services)
- **Bottom line:** Implementing **LBP CPGs** in outpatient PT **reduces both direct PT costs and downstream healthcare costs.**

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Knowledge gaps

- **Validated Movement System Diagnoses**
  - Need standardized, tested categories to identify movement dysfunctions
  - Would help PTs move beyond pathoanatomical labels
  - Requires **structured training**
- **Low Adherence to CPGs Among PTs**
  - Survey of 410 PTs: only **46–72% adherence** to LBP CPGs
  - Adherence especially low for coordination impairment & fear-avoidance cases
  - Highlights need for **better clinical reasoning & education** to align care with evidence

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Case Example for Class Activity

- **Patient Name:** 33 years old, male
- **History:**
  - Works as a software engineer (sits 8–10 hours/day)
  - Reports 4-month history of recurrent low back pain that worsens by end of workday
  - Pain sometimes refers into the posterior right thigh (non-radicular)
  - No red flags; no trauma or previous surgery
- **Subjective Exam:**
  - Describes pain as dull/aching, 4/10 at worst
  - Reports fear of exercise worsening pain
  - Avoids physical activity due to discomfort
- **Objective Exam:**
  - Positive instability catch during forward bending
  - Weakness noted in trunk flexors/extensors
  - Poor control with lumbopelvic movement tasks (e.g., bridging, prone hip extension)
  - FABQ score elevated (especially physical activity subscale)

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Match Case 1 to:

- A) **Movement System Diagnosis:**
  B) **Irritability Level:**
  C) **CPG-Based Intervention:**

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Case Example 2 for Class Activity

- **Patient Presentation**
- **Age:** 31-year-old woman 8/10 pain
- **History:** Acute onset of low back pain 5 days ago after twisting while lifting a box.
- **Symptoms:** Localized pain across the lower lumbar spine, worse with right rotation. No leg pain. Right rot 50% of normal range
- **Exam Findings:**
  - Lumbar ROM: markedly limited and painful with right rotation
  - Asymmetry of lumbar paraspinal muscle tone (R, hypertonic)
  - Segmental hypomobility palpated at L4-L5
  - Straight leg raise negative bilateral
  - Neurologic screen normal (strength, sensation, reflexes)
  - No red flags

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Match Case 2:

- A) **Movement System Diagnosis:**
  B) **Irritability Level:**
  C) **CPG-Based Intervention:**

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Case Example 3 for Class Activity

- **Patient Presentation**
- **Age:** 46-year-old man
- **History:** 2-week history of low back pain radiating down the left buttock and posterior thigh to the calf. Onset after yard work.
- **Symptoms:** Worse with sitting >20 minutes and bending forward. Relieved with standing/walking.
- **Exam Findings:**
  - Lumbar flexion reproduces leg pain
  - Lumbar extension reduces (centralizes) symptoms
  - Positive left straight-leg raise at 40°
  - Mild weakness in left great toe extension (EHL 4/5)
  - No bowel/bladder changes, no red flags

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Match Case 3 to:

- A) **Movement System Diagnosis:**
  B) **Irritability Level:**
  C) **CPG-Based Intervention:**

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Bottom line:

- **Function > Pathoanatomy**:
  - Focus on functional classification, clinical patterns, and CPG-guided treatment (not just imaging/labels).
- **Use Evidence-Based Classifications**:
  - Movement system diagnoses, patient irritability, and CPG/TBC frameworks = safer, more individualized care.
- **Active Care is Key**:
  - Targeted exercise + patient-specific education = cornerstone of LBP management.
- Manual therapy & other modalities = **adjuncts only**.

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Clinical process

- **Screen early for red flags** → refer or triage if needed
- **Start universal** → **refine to specific** through clinical reasoning
- **Pattern recognition** while respecting pathoanatomy
- **Assess irritability** with SINSS framework
- **Apply CPG recommendations** to guide interventions

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Questions and Wrap-Up

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THANK YOU

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