Treatment-Based Classification of Acute Low Back Pain: 
*Simplifying Clinical Decision Making*

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Objectives
- Explain the rationale & potential benefits of treatment-based classification for acute LBP
- Differentiate acute lumbopelvic spine disorders into distinct classes based on examination findings
- Describe evidence-supported physical therapy interventions appropriate for each LBP classification

Traditional Eval & Rx Process...

Exam Findings ➔ Pathology-Based Diagnosis ➔ Treatment of Pathologic Anatomy

“Houston, we’ve had a problem.”

The precise structural pathology that produces LBP cannot be determined definitively ~85% of the time w/ comprehensive testing (physical exam, imaging, lab)

“Treatment-Based” Classification
- Delitto & colleagues (1999) proposed a treatment-based classification system for individuals w/ acute LBP

Exam Findings ➔ Presumed Best-Rx Sub-Grouping ➔ Treatment Based on Sub-Grouping

- This system has been shown to produce better clinical outcomes than non-classification approaches Fritz & George 2000, Fritz et al. 2003, Fritz & Brennan 2007

If structural pathology causing LBP cannot be conclusively determined *most of the time*, how can we be confident in what we’re treating?

Exam Findings ➔ Pathology-Based Diagnosis ➔ Treatment of Pathologic Anatomy
Instead of trying to identify a specific patho-anatomical structure or pathology...

Patients can be classified according to:

**IMPAIRMENTS & SYMPTOMS**

Therefore:

**Treatment focus = impairments**

“Impairment(s)-Based Treatment Approach”

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For Your Consideration...

- Effects of interventions are not tissue-specific
  - Effects are not isolated to one structure
- Pts’ goals usu. pertain to impairments & functional limitations – not tissues
  - “I want less back pain & greater motion” (vs. “Please fix my disc”)

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Classifying: Acute Pain Control

- High-level of pain (≥7/10), irritability, disability
- May have spinal joint hypomobility but too irritable to manipulate/mobilize
- May have spinal joint hypermobility but too irritable to exercise

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Classifying

Because the source of non-specific LBP is (by definition) indeterminate, it is sensible to classify pts. into subgroups based on “Which treatment approach is most likely to be beneficial?” vs. “What’s the pain generator?”

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Classifying

- Classification system for acute LBP by Fritz & George (2000)
  - Specific Exercise
  - Traction
  - Manipulation (Mobilization)
  - Stabilization
- My additions:
  - Acute Pain Control
  - Myofascial Pain Control

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An updated overview of clinical guidelines for the management of non-specific low back pain in primary care

- Summary of clinical treatment guidelines from 14 different countries
  - Each guideline is a summary of available evidence to support, refute, or fail to support specific interventions

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Summary of Recommendations from LBP Guidelines (from 14 Countries) Koes et al. 2001; 2010

**Acute or Subacute Pain**
- Provide reassurance
- Advise to stay active
- Prescribe medication prn
- Discourage bed rest
- Consider manipulation
- Do not advise back-specific exercises
- Do not advise a supervised exercise program

**Chronic Pain**
- Exercise therapy
- Discourage modalities
- Short-term use of meds or manipulation
- Supervised exercise
- Cognitive-behavioral Rx
- Multidisciplinary Rx

**Level of Evidence**

<table>
<thead>
<tr>
<th>Level of Evidence</th>
<th>Interventions</th>
<th>Prevalence of Utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong evidence to support effectiveness</td>
<td>Advice to stay active</td>
<td>3%</td>
</tr>
<tr>
<td>Moderate evidence to support effectiveness</td>
<td>Spinal manipulation</td>
<td>3%</td>
</tr>
<tr>
<td>Moderate evidence to support effectiveness</td>
<td>Spinal mobilization</td>
<td>68%</td>
</tr>
<tr>
<td>Limited/contradictory evidence</td>
<td>Ultrasound, massage, TENS, Back School, acupuncture, LASER, lumbar supports</td>
<td>90%</td>
</tr>
<tr>
<td>Unknown</td>
<td>Heat, Ice, Mulligan techniques, Sahrmann techniques, pool, taping, postural correction, work hardening</td>
<td>96%</td>
</tr>
<tr>
<td>Moderate evidence to support ineffectiveness</td>
<td>Aerobic conditioning, McKenzie technique, back stabilization exercise, lumbar ROM/stretches, leg ROM/stretches, lumbar strength exercises, traction</td>
<td>93%</td>
</tr>
<tr>
<td>Strong evidence to support ineffectiveness</td>
<td>Advice to take bed rest</td>
<td>0%</td>
</tr>
</tbody>
</table>

**Classifying: Specific Exercise**
- Pts. w/ pain or paresthesias (N/T) in LE(s) that centralize w/ movement or positioning
- The movements (extension, flexion, lateral shift) that produce centralization (or sx reduction) are used for treatment

**Centralization: Defined**
- Migration of referred pain towards spine
- Antonym = “peripheralization”

**Advise to stay active...**
- DO: temporarily modify/↓ activity prn
- DO: gradually ↑ activity as symptoms allow
- DON’T: wait for LBP to fully resolve before resuming activities

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Classifying: Specific Exercise

- Pts. who centralize w/ **extension** or **lateral flexion** tend to be 30-50 yrs. & often have signs & symptoms of **IVD pathology** Porter & Miller 1986, McKenzie 1989

- Pts. who centralize w/ **flexion** tend to be >50 yrs. & often have degenerative or **stenotic** spinal conditions Fritz & George 2000
  - Prefer sitting (flexion) to walking (extension)

LBP w/ Radicular Features

- **The Good**: unilateral radicular sx's that centralize readily; no signs of conduction loss – NO BRAINER
- **The Bad**: radicular sx's that do not centralize; signs of conduction loss; crossed SLR – BRAINER
- **The Ugly**: cauda equina or cord compression sx's – NO BRAINER

Classifying: Traction

- **Little supportive research**

- May be beneficial for:
  1. Pts. w/ LE sx's that do not centralize w/ movement/positioning OR that peripheralize w/ extension
  2. Pts. w/ a crossed SLR Fritz 2007
Mechanical Lumbar Traction

- *Traction may help pts. achieve centralization w/ movement or positioning*
  - Once this occurs, see if sxs will centralize w/ movement/positioning alone (i.e. transition to spec. ex. class)

- Referral is warranted if sxs & signs of nerve root compression are worsening

Inversion Therapy??

- **89% (155/175)** of pts. unable to work due to LBP returned to work after 8 inversion Rxs
  *Sheffield et al. 1964*

- Paraspinal EMG activity ↓’d 35% within first 10 secs. of inversion
  *Nosse et al. 1978*

Classifying: Mobilization

- Traditionally, passive mobility tests have been used to determine if mobilization/ manipulation is indicated
- However, passive mobility tests have been shown to have poor reliability & questionable validity *Dreyfuss et al 1994, Dreyfuss et al 1996*

Classifying: Mobilization

- Flynn et al 2002 developed a criterion-based model to predict which pts. w/ LBP are likely to benefit from manipulation

  - Presence of ≥4 criteria was strongly predictive of a dramatic response to manipulation...

Flynn et al. *Spine* 2002

Predicting Success w/ Manipulation

**If ≥4 of these present:**

- Recent onset (<16 days)
- Low FABQ-W (<19)
- No symptoms below knee
- ≥1 hypomobile segment
- Hip IR ≥35° (L or R)

**Pre-test Probability of Dramatic Success w/ Manipulation**

- 45%

**Post-test Probability of Dramatic Success w/ Manipulation**

- 95%

**Pre-test Probability of Dramatic Success w/ Manipulation**

- 45%

**Post-test Probability of Dramatic Success w/ Manipulation**

- 95%

**If ≥4 of these present:**

- Duration of symptoms (<16 days)
  + LR = 4.4 (shifts probability from 45% to 80%)

  - No sxs below knee AND sx duration <16 days
    + LR = 12.8 (shifts probability from 45% → 92%)

- NOTE: Presence of these 2 factors alone = good chance of short-term success w/ manipulation
  *Childs et al. Ann In Med 2004*

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Potential Therapeutic Effects of Mobilization/Manipulation

- Q: **Does it correct a stuck/mal-aligned joint?**
- A: Unknown/unproven
  - Existing evidence does not support an association between changes in spinal stiffness & outcomes after manual Rx. **Seoggrass et al. 2012**
  - Manipulation of random segment as effective as manip. targeted to segment w/ apparent restriction. **Hass 2003**

Lumbopelvic Manipulation

- No mobilization/manipulation technique has been shown to be superior to others.
  - **Chiradejnant et al. 2003, Fritz et al. 2006**
    - Randomly assigned technique as effective as clinician’s preferred technique for non-specific LBP
  - Location of mobilization/manipulation does not appear to be vital to treatment success
    - Manipulation of upper T-spine in pts. w/ chronic LBP as effective as manip. of painful L-spine segments. **de Oliveira et al. 2013**

So...what does manipulation do?

- **Neurophysiologic mechanisms?**
  - Immediate response:
    - Pain ↓ via "Gate Control"
    - Reflexive alteration of muscle activity
      - Relaxation of paraspinals. **Herzog et al. 1999, Colloca et al. 2001**
      - Multifidus recruitment ↑. **Fritz et al. 2011**
  - Delayed response:
    - Serotonin release. **Herzog et al. 1999, Colloca et al. 2001**
    - Multifidus recruitment ↑. **Fritz et al. 2011**

- **Treatment expectation & placebo?**
  - **Bialosky BMC Musculoskeletal Discord 2008, Bialosky et al. JOSPT 2008**

Treatment Expectation

- Patients expect active interventions (e.g. exercise, manipulation) to improve their LBP more than passive interventions (e.g. modalities)
- Believing that manipulation would help but NOT receiving it significantly ↓’d odds of treatment SUCCESS. **Bishop et al. JMMT 2011**

Is a “POP” Necessary for Rx Success?

- A: Appears to be physiologically unnecessary but may be psychologically beneficial (thus physiologically beneficial via placebo??)
- Occurrence of pop has not been shown to improve odds of improvement after manipulation. **Flynn TW, et al 2003**

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Is a Thrust Necessary for Rx Success?

- **A:** Unknown
- Hadler et al (1987): Greater benefit from thrust vs. non-thrust procedures
- Cook et al. (2013): No significant difference between thrust vs. non-thrust procedures

Is Lumbar Manipulation Risky?

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Proposed Risk</th>
<th>Estimated # Complications / 10,000</th>
<th>Potential Complication</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-S Manipulation*</td>
<td>1/10,000,000</td>
<td>0.001</td>
<td>Cauda Equina syndrome</td>
</tr>
<tr>
<td>Vigorous Exercise**</td>
<td>1/1,500,000</td>
<td>0.007</td>
<td>Sudden death</td>
</tr>
<tr>
<td>NSAIDs***</td>
<td>1-3/100</td>
<td>100-300</td>
<td>GI bleeding</td>
</tr>
</tbody>
</table>

* Halderman & Rubenstein Spine 1992
** Albert et al NEJM 2000
*** Tamblyn et al Ann Int Med 1997

Which Pts. w/ LBP are Most Appropriate for Manipulation?

- **Recent onset** of sx
- **No/low** fear-avoidance beliefs/behaviors
- **Agreeable** to manipulation
- **No** radicular/myelopathic sx (sx above knees)
- **No/low** irritability
- **Mechanical** LBP (vs. inflammatory or centrally-mediated)

For What It’s Worth…

- Stabilization classification may be more appropriate for pts. w/ **sub-acute** sx
- Stabilization exercises may be more beneficial in **preventing a recurrence** of LBP vs. ‘treating’ an acute episode of LBP
  - Resistive ex’s performed during acute LBP can easily exacerbate symptoms

Which exam findings suggest that a patient is likely to benefit from stabilization exercises?

- Positive clinical instability testing?
  - Maybe...
- Abnormal movement?
  - Maybe....
- Age <40?
  - Maybe...

However, pts. w/ 1) **aberrant movement** and 2) **positive prone instability test**, had less disability after 8 weeks of L/S stab. ex’s

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Disagreement exists as to which mm. are more important to stability

<table>
<thead>
<tr>
<th>Local/Deep</th>
<th>Global/Superficial</th>
<th>And...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attach to vertebrae</td>
<td>May/not attach</td>
<td></td>
</tr>
<tr>
<td>Short moment arms</td>
<td>to vertebrae</td>
<td></td>
</tr>
<tr>
<td>Small CSA</td>
<td>Long moment arms</td>
<td></td>
</tr>
<tr>
<td>Spindle-dense</td>
<td>Large CSA</td>
<td></td>
</tr>
<tr>
<td>e.g. multifidus, TrA</td>
<td>e.g. erector sp.</td>
<td></td>
</tr>
</tbody>
</table>

Disagreement exists as to how to rehab these muscles while avoiding the negative consequences of excessive muscle activity !!

- Contracting more than necessary would...
  1) ↑ L/S compression (mortar & pestle)
  2) ↓ movement economy/efficiency
- During walking, ext. oblique EMG is ~5% MVIC
  White & McNair 2002
- When lifting ~15kg from flexed position, mm. co-contraction ↑s ~1.5% MVIC
  van Dieen et al. 2003

Outcomes Evidence re: Pts. w/ Subacute or Chronic LBP

- No diff. between grps. **multifidus & TrA ex. vs. general trunk ex.** Koumantakis et al. 2005
- No diff. between grps. **multifidus & TrA ex. vs. “conventional PT”** Cairns et al. 2006
- **Motor control** grp. had better outcomes @ 2-mos. vs. **general ex. grp. but no differences between grps. @ 6 or 12-mos.** Ferreira et al. 2007
- No diff. between grps. **“motor control” ex. (mult. & TrA) vs. graded activity** Macedo et al. 2012

What’s peculiar about this study?

- Helewa et al (1999): 402 asymptomatic subjects, identified as having weak abdominal muscles, were treated with back education or back education plus abdominal strengthening exercise
- Results: No significant differences were found between the groups re: number of episodes of LBP
- Note: prior to the study, all 402 identified as having **weak abdominals** were **asymptomatic**

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**Bottom Line**

- Consideration should be given to each spine stabilizing muscle when designing exercise programs to ↑ stability.
- Stabilization exercises may have a “central” effect, unrelated to muscle function. Mannion et al.

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**Myofascial Pain Control Classification** (My Addition)

**Typical findings**

- Trigger points/taut bands that reproduce concordant LBP
- Low-moderate pain & disability scores
- May have ↓'d ROM (d/t pain) but normal passive joint play

**Matched Interventions**

- Soft tissue mobilization
  - Massage
  - Myofascial release (MFR)
  - Trigger point dry needling (TDN)
- Instrument-assisted soft tissue mobilization (IASTM)
- Other physical modalities to promote soft tissue relaxation/health (e.g. heat)

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**Instrument-Assisted Soft Tissue Mobilization (IASTM)**

- Shaped plastic or metal instruments are rubbed firmly along skin over injured tissue
  - E.g. ASTYM, Graston, Gua sha

- **Why:** controlled microtrauma → hyperemia → ↑’d fibroblast proliferation
  
  Davidson et al. 1997; Gehlsen et al. 1999

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**Ottawa Panel evidence-based clinical practice guidelines on therapeutic massage for low back pain**

Conclusion: massage is effective for ↓'ing pain & disability in short term for pts. w/ sub-acute & chronic LBP when combined w/ exercise & education.

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**Trigger-Point Dry Needling**

**What:** Acupuncture needle inserted directly into taut band/trigger point

**Why:** May promote muscle relaxation

**For Your Consideration...**

- Interventions w/ each class represent treatment EMPHASIS
  - *Pts. assigned to one class may benefit from interventions associated w/ another*

- Once treatment emphasis is decided, pt. should be serially re-evaluated & adjustments made based on **TREATMENT RESPONSE**

**For Your Consideration...**

- **Not all patients fit into an obvious class**
  - ~1/3 of pts. w/ LBP have **unclear** classification
  - Stanton et al. 2012

- Regardless of classification, the objective w/ acute LBP is to ↓ pn. & ↑ functional ability

- Rx emphasis may differ for sub-acute or chronic LBP
  - For sub-acute LBP → prevention of recurrence
  - For chronic LBP → behavioral management

**The Original Treatment-based Classification System**

- **Does it move?**
  - No ↓ Should it? No ↓ No problem
  - Yes ↓ Should it? Yes ↓ No problem

**A Parting Thought: LBP ≈ URI**

- **Similarities**
  - Ubiquitous
  - Tend to resolve spontaneously (regardless of Rx)
  - Multiple symptom remedies are available
  - Overtreatment is not uncommon
    - Antibiotics for a URI
    - Aggravating exercise or surgery for non-radicular LBP
  - Occurrence risk can be reduced (although some individuals are susceptible)