10/23/2018

Are You Up To Date? Clinical Practice Guidelines Applied to Everyday Practice:

Lumbar Spine

October 26-28, 2018



Physical Therapy Program

Instructors

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Course Description

The purpose of this course is to *update* the orthopedic clinician *on the current evidence* surrounding diagnosis, prognosis, intervention, and assessment of outcomes *for the lumbar spine*. Published Clinical Practice Guidelines will be used to structure the course. The course will also provide an opportunity for hands on learning of selected examination and intervention techniques.

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Course Objectives

- Describe the history, purpose and utility of Clinical Practice Guidelines
- Describe International Classification of Function (ICF) as it applies to patient care and physical therapy practice
- Review evidence pertaining to key elements of history and differential diagnosis in the lumbar spine
- Refine and advance skills in clinical examination and evaluation of the lumbar spine
- Refine and advance skills in manual intervention and exercise progression in the lumbar spine
- Review applicable case scenarios (time permitting) as a method of learning key principles from the Clinical Practice Guidelines

Thank you!!!! Thank you in advance to numerous individuals who have given us permission to share content

• Tim Flynn

Lauren Hinrichs

- Paul Mintken
- Bob Boyles
- John Childs
- Josh Cleland
- Julie Whitman

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What to expect?

- Open Q & A
- Will openly discuss controversial areas and address areas that are important, but have not yet risen to level of CPG
- · Mix of lecture and lab content, handouts



Basic schedule

- Intro to Clinical Practice Guidelines broadly
- Intro to Clinical Practice Guidelines Low Back Pain (Ortho Section APTA)
- Lumbar relevant radiology/imaging
- Lumbar Spine Examination
- Lumbar Spine Intervention
- Special Populations
- Past, Present and Future

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Key to getting most out of Cont-ed

Make a list along the way

- Think of patients you are seeing
- Think of patients you have struggled with
- Think of ways to apply on Monday morning
- Make a list of at least 3 points to integrate into practice



Consider: Evidence-informed practice

- Definition: the process of integrating research evidence when available but including personal recommendations based on clinical experience, while <u>retaining</u> <u>transparency</u> about the process used to reach clinical decisions.
- (AND PATIENT VALUES!)

Haldeman S, Dagenais S. What have we learned about the evidence-informed management of chronic low back pain? Spine J 2008;8:266e77.



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What is a Clinical Practice Guideline? (CPG)

- Clinical practice guidelines lie at the intersection of medical research, education, and practice.
- Informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options.
- Must follow standards for transparency and literature evaluation developed by Institute of Medicine.

(Lo, 2009)





Which studies are incorporated into CPG's?

- Ideally, systematic reviews and metaanalyses
- Rarely at that level because that level of evidence is rare
- Especially an issue in PT



Who can develop CPG's?

- · Any professional organizations or other recognized entity
- APTA (by Section), AAOS, AAPMR, etc.
- In PT, they are in process or have been published through most of the Sections.
 - Ortho Section has the most (lumbar, cervical, nonarthritic hip pain, hip OA, heel pain-plantar fasciitis, adhesive capsulitis)
- AHRQ (Agency for Healthcare Research and Quality) has developed an entire "Clearinghouse" of CPG's.

http://www.guideline.gov/

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Who has developed CPG's?

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Completed APTA CPG examples...

Title	Section of APTA
Diagnosis of Upper-Quadrant Lymphedema Secondary to Cancer: Clinical Practice Guideline	Oncology
Hip Pain and Mobility Deficits—Hip Osteoarthritis	Orthopedic
Heel Pain-Plantar Fasciitis	Orthopedic
Low Back Pain	Orthopedic
Role of Physical Therapists in the Management of Individuals at Risk for or Diagnosed With Venous Thromboembolism: Evidence-Based Clinical Practice Guideline	CardioPulmonary

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Aims of the Guidelines Orthopaedic Section, APTA, Inc

- Describe diagnostic classifications based upon ICF terminology
- Describe best outcome measures to use
- Describe best intervention strategies that are matched to the classification



Goal/Problems with standardization

- · Guidelines translate best evidence into best practice
- A well-crafted guideline:
 - improves diagnostic accuracy
 - promotes effective therapy
 - discourages ineffective or potentially harmful interventions
 - promotes quality by reducing unwarranted variation

(Rosenfeld, 2009)



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Aims of the Guidelines Orthopaedic Section, APTA, Inc

reduce <u>unwarranted variation</u>

 do the right thing at the right time for the right patient

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Transparency in this course

- Lumbar Spine CPG published in 2012
 - With some of our interpretations
- Updates presented at Orthopedic Section Meeting in 2016
- Other published research where CPGs fall short especially Systematic Reviews in past 3 years
- Clinical Expertise sprinkled in

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What we are up against...

CLINICAL GUIDELINE



Noninvasive Treatments for Acute, Subacute, and Chronic Low Back Pain: A Clinical Practice Guideline From the American College of Physicians

 Moderate-quality evidence showed no difference between spinal manipulation and other active interventions for pain relief at 1 week through 1 year or function (analyses included exercise, physical therapy, or back school as the comparator)

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Some criticism...



What are the concerns? O'Connell 2018

- Conflicting recommendations
- Concerns about variation:
 - · Reasonable sources of variation
 - differences in health care infrastructure
 - search dates adopted by the guideline development groups.)
 - · Less desirable sources of variation
 - · differences in the interpretation of benefits and harms
 - the influence of the local political landscape
 - the constitution of the guideline committee



The constitution of the guideline committee for Ortho Section CPG on LBP

Anthony Delitto PT, PhD Steven George PT, PhD Linda Van Dillen PT, PhD Julie M. Whitman PT, DSc Gwendolyn Sowa MD, PhD Paul Shekelle MD, PhD Thomas Denniger DPT Joseph Godges DPT, MA



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Difficult task...

O'Connell, 2018

- Required to synthesize information that is based on incomplete and equivocal research.
- In the face of uncertainty, the willingness of development groups to make positive or negative recommendations based on expert judgment is likely to vary.
- Methodological and statistical challenges with how PT research is conducted, especially with often necessary incomplete blinding.



Quite the task...

September 28, 2018, search of Google Scholar with terms back pain and physical therapy limited to 2017 and 2018, resulted in over 21,000 results

k	Google Scholar	"physical therapy" back pain	٩	
	Articles	About 21,400 results (0.04 san)		
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Implementation of Guidelines is difficult

Known barriers include:

- clinicians' knowledge and understanding of the guideline
- willingness to accept its recommendations (often in the face of deeply held beliefs, clinical experience, and vested interests)
- feasibility of implementing the recommendations within local clinical structures
- accessibility and credibility of the guideline itself and the acceptability, or lack thereof, of the guideline Fischer, 2016



Adherence to Clinical Practice Guidelines for Low Back Pain in Physical Therapy: Do Patients Benefit?

- Higher adherence associated with fewer functional limitations and fewer treatment sessions
- Higher guideline adherence related to better improvement of physical functioning and to lower utilization of care.

Rutten, 2010

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In summary...



Questions?



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Clinical Decision Making

- Applying knowledge, skill, and intuition to make decisions
- Includes context and personal interactions
- Uses reflection achieve a successful outcome for an individual patient



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Dual Process

System 1: Analytical/Rationale

System 2: Intuitive

- Exhaustive method
- Hypothetico-deductive method
- Requires knowledge
- Easy to put into words
- Repetitive use of System 1 leads to better understanding and development of System 2
- Mostly at the subconscious level
- · Pattern recognition
- Intuition
- More developed in experienced practitioners
- Difficult to put into words
- Low Scientific Rigor

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Characteristics of expert clinicians

- Efficient at perceiving patterns and solving problems in their area of expertise
- Utilize *current* practice knowledge
- Reflective self-awareness and strong meta-cognitive skills
- Can justify clinical decisions articulately to patients, family, and colleagues
- Provide patient-centered, collaborative care
- DO NOT automatically accept the validity of information seen or heard without critically evaluating it themselves

Glaser & Chi, 1998; Higgs & Jones, 2000





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Experienced non-expert?



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Experts use both processes depending on context



System 1 (intuitive) does not make sense in many contexts.....



An analytical approach (System 2) in an emergent/immediate situation, where rapid decision making is called for, may be paradoxically irrational.



Mark of good decision-maker:

- ability to <u>match</u> 2 systems to their respective optimal contexts
- consciously <u>blend</u> them into overall decision making. (Croskerry)



Experts...

- Apply highest levels of evidence (Analytical System 1) when available (CPGs)
- Apply intuition (System 2) when it is not
- Can explain rationale for both (transparency)



Questions?



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The biopsychosocial model



Traditional Biomedical model

- Tradition in Medicine
 - "Health" means the freedom from disease, pain, or defect, therefore the normal human condition is "healthy"
 - · Episodic care instead of continuous care
 - Asymmetry of power (expert "tells patient what to do")
 - Based on compliance



The Medical Model of Disease



Shortcomings of the Medical Model in LBP



- LBP is a disease with no specific biomarkers
- Only
 [≅] 15% of LBP can be given a specific pathoanatomical diagnosis
- The remaining grouped as a homogenous entity (low back sprain/strain, etc.)
 - · Any treatment equally likely to succeed or fail
 - How effective would medicine be if they only used 1 antibiotic to treat all infections?

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Shortcomings of the Medical Model

- Pathoanatomical findings often present in asymptomatic people:
 - 20% had intersegmental motion exceeding stability thresholds (Hayes, 1989)
 - Only 36% had normal discs at all levels on MRI (Jensen, 1994)
 - 64% were "abnormal"!!!
 - Mild scoliosis, disc degeneration, spondylosis are AS common on asymptomatic as symptomatic x-rays



Traditional Biomedical model in PT

- Tradition in PT
 - Patient comes to PT to "get fixed"
 - Emphasis on impairment level (get the joint to move better, strengthen the specific muscle)
 - Little emphasis on the patient's role beyond "complying with PT's instructions"
 - Little concern for patient preference, more concern with PT's preference (do what I say-*comply*)
 - Episodic care (reinforced by payment system)
 - Lack of person-first language and focus (the "knee patient" vs. a person with a knee problem)

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Quarter jar challenge

• Every time someone says "the back" when referring to a patient or "the knee patient" instead of person with knee injury, costs them a quarter...



Shortcomings of the Medical Model

 "Treatment of back pain according to the disease model has failed because there is a fundamental flaw to the approach. The disease model views back pain and disability only in terms of spines and physical disease. It does not allow for the complex human responses to pain and disability."



(Waddell, 1998)

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"Low back pain disability depends more on fear avoidance than on pain or physical pathology... The fear of pain is more disabling than the pain itself." (Waddell, 1993)





Biopsychosocial model

- Based on patient empowerment and participation in decisionmaking
- Continuous instead of episodic care
- Acknowledgement of social and psychological influences

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Biopsychosocial Model

- The clinical expression of pain encompasses numerous aspects besides physical dysfunction:
 - Attitudes and beliefs
 - Psychologic distress
 - Illness behavior
 - The social environment





Biopsychosocial Model



Psychologically informed practice (Main, 2011)

- · Applied biopsychosocial model to PT practice
- Builds upon the established professional expertise of physical therapists, but incorporates systematic attention to the psychosocial factors that are associated with outcome of treatment.
- Main, 2011: Highly recommended
 - Incorporation of concepts into your communication and practice

Psychologically informed PT (PIPT) works

- PIPT, through one-on-one, group, and telephone formats, can achieve positive improvement in clinical outcomes.
- Graded activity, goal setting, and cognitiverestructuring are common components.
- Stratifying patients and applying targeted PIPT may improve treatment effectiveness.

Archer, 2018 The Role of Psychologically Informed Physical Therapy for Musculoskeletal Pain

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Potential influencing factors from psychosocial side

- Motivation
- Caregiver status
- Patient Preference
- Patient motivation, conscientiousness
- Health Literacy
- Patient expectations

- Convenience factors
- Location/access
- Nutritional habits
- Therapist equipoise
- Patient expectation
- How healthy do you feel today vs. 6 months ago?
- Readiness for change?

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Of note: Motivational Interviewing

- O: Open-ended questions
- A: Affirmations
- R: Reflection
- S: Summary
- · Highly recommended education/training

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Questions?





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CPG-Background



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Prevalence

- Estimated that 80% of human adults have LBP at some point in their life
 - Only 25% actually seek care
- 40% of any large gathering will have LBP
- · 60% of the population will have LBP in past year
- Up to 85% will have recurrent LBP
- 40-60% still report pain a year later

Luo et al. *Spine* 2004 Manek *Curr Opin Rheumatol* 2005

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Economic Burden

- · Single most expensive musculoskeletal ailment
- Cost is \$100-200 billion a year in
 - direct (health care, counseling, etc.) and
 - indirect (lost work, job changes, etc.) costs
- LBP accounts for 25% of all lost work days
- 10% of claimants for LBP account for 70-80% of cost (Spengler et al)
- Back pain is the most common cause of disability in those under the age of 45
- Second most common reason for work absence
- 30% of all compensation cases are for LBP Carey and Freburger Ann Fam Med March/April 2014 vol. 12 no. 2 99-101 http://www.annfammed.org/content/12/2/99.short

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Despite increasing medical expenditures dedicated to its management, the prevalence of chronic, disabling LBP continues to increase

Martin BI, Deyo RA et al. Expenditures and health status among adults with back and neck problems. *JAMA*. 2008



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RISK FACTORS??

 Current literature does not support a definitive cause for initial episodes of low back pain. Risk factors are multifactorial, population specific, and only weakly associated with the development of low back pain. (Delitto et al, 2012)

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Psychosocial factors play a larger role in prognosis

- Distress/depression
- Fear-avoidance



- Screening tools are essential
- Pain drawings not considered effective



Recurrence of LBP

- Systematic Review (SR) for risk of recurrence
 - Previous SR:
 - Prognostic factors of heavy lifting, sleeping difficulties, and prior LBP
 - Current SR:
 - Hx of previous LBP only prognostic factor
 - 1-year recurrence = 33% (est.)

DaSilva et al, 2017

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Clinical Course of Low Back Pain





Clinical Course of Low Back Pain (Theoretical Evidence)

Due to high level of recurrence and progression into chronic pain, clinicians should screen for factors that contribute to recurrence and chronic pain.



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Clinical Course of Low Back Pain

- Acute
 - < 1 month
- Subacute
 - 2-3 months
- Chronic
 - >3 months

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Approach to low back pain-the goal is to prevent Recurrence and Chronicity

Recurrence

- Prior episode
- Excessive spinal mobility
- Excessive mobility in other joints

Chronicity

- Symptoms below knee
- Depression/psychosoci al
- Fear of movement
- · High pain intensity
- · Passive coping style

(Pincus et al, 2002; Jones, Macfarlane, 2005)

(Mogren, Pohjanen, 2005)

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Back pain is more complicated than this...




- Diagnosis and Classification
 - Anatomical vs Symptomatic
 - TBC
 - ICF Impairment of Body Functions
 - ICD Impairment Based Classification
 - Red and Yellow Flags

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Diagnosis and Classification of LBP

- Symptomatic vs. Anatomical Classification (strong evidence)
- Treatment-Based Classification (strong evidence) 4 classifications
- ICF Impairment of Body functions (strong evidence) 12 classifications

Symptomatic vs Anatomical



- Movement away from pathoanatomic diagnosis
 - We can't be sure
 - Evidence de-emphasizes anatomic lesion
- Interventions based on subgrouping are more successful



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What causes LBP?

- We can only diagnose definite pathology in about 15% of patients with LBP.
- There is <u>very little</u> 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.



- Diagnosis and Classification
 - Anatomical vs Symptomatic
 - TBC
 - ICF Impairment of Body Functions
 - ICD Impairment Based Classification
 - Red and Yellow Flags



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Treatment Based Classification



 Uses subjective and objective information from examination to subgroup patients

20,200

- More effective treatments
- Sub-grouped patients who receive matched intervention have better outcomes
- What are the limitations to TBC?
 - Subacute and Chronic LBP

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An alternative approach?

Clinical Classification Approach:

"...the process of classifying clinical data into named categories of clinical entities for the purpose of making clinical decisions regarding therapeutic management"

(Rose, 1989)

Treatment Based Classification



Treatment Based Classification

TBC originally developed for acute or recurrent LBP (Delitto et al 1995)

- 3 levels of classification:
 - **1. First Level:** Is the patient appropriate for rehabilitation management?
 - 2. Second Level: What is the level of acuity? (staging the patient)
 - 3. Third Level: What treatment should be used? (classification)



First Level Appropriateness for Care

First step of classification = is the patient appropriate for rehabilitation?



Treatment Based Classification



Reliability and Validity of the TBC

- Interrater Reliability: Overall 75.5% agreement, κ = 0.60
 - Henry et al 2012
- Classification exclusivity: Subgroup criteria mutually exclusive in 50% of cases. In remaining 50%, patients either met the criteria for more than one subgroup (25%) or did not meet the criteria for any subgroups (25%)
 - Stanton et al 2011
- Validity: Lower cost, increased effect size and significantly better outcomes for pain and disability if PT used TBC vs. pragmatic approach
 - Fritz et al 2003, Brennan and Fritz et al Spine 2006

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Even more recent!!

TBC Evolves...

Treatment-Based Classification System for Low Back Pain: Revision and Update

Alrwaily M, Timko M, Schneider M, et al. Treatment-Based Classification System for Low Back Pain: Revision and Update. *Phys Ther.* 2016;96:1057-1066.





Alrwaily M, et al. Treatment-based classification

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Example of hierarchical exercise progression for patients matched to symptom modulation approach.



Example of hierarchical exercise progression for patients matched to movement control approach.



CPG/ICF classification system differs from TBC

- 1) Terminology based on body function impairments
 - LBP with mobility deficits
 - LBP with movement coordination impairments
 - LBP with related lower extremity pain
 - LBP with radiating pain
 - LBP with related generalized pain

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CPG/ICF classification system differs from TBC

- 2) Cognitive or Affective Tendencies and Generalized Pain
 - Movement Impairments and...
 - Impairment in Mental Functioning





CPG/ICF classification system differs from TBC

3) Level of acuity

Time since onset of symptoms





Patient pain with activity or with passive movement



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Potential Solution

Clinical practice guidelines for LBP have been developed in part to decrease variability and narrowing the range of care that is provided



- Diagnosis and Classification
 - Anatomical vs Symptomatic (strong evidence)
 - TBC (strong evidence)
 - ICF Impairment of Body Functions (strong evidence)
 - ICD Impairment Based Classification
 - Red and Yellow Flags (varying levels of evidence)



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Low Back Pain ICF Impairment-based Classification (strong evidence):

Acute and Sub Acute Low Back Pain with Mobility Deficits

Acute, Sub Acute, and Chronic Low Back Pain with Movement Coordination Impairments

- Acute Low Back Pain with Related (Referred) Lower Extremity Pain
- Acute, Sub Acute, and Chronic Low Back Pain with Radiating Pain
- Acute or Sub Acute Low Back Pain with Related Cognitive or Affective Tendencies

Chronic Low Back Pain with Related Generalized Pain J Orthop Sports Phys Ther. 2012;42 (April): A1-A57



- Diagnosis and Classification
 - Anatomical vs Symptomatic
 - TBC
 - ICF Impairment of Body Functions
 - ICD Impairment Based Classification
 - Red and Yellow Flags

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Low Back Pain ICD Impairment-based Classification:

Acute and Sub Acute Low Back Pain with Lumbosacral Segmental/Somatic Dysfunction- ICF Mobility Deficits

Acute, Sub Acute, and Chronic Low Back Pain with Spinal Instabilities- ICF Movement Coordination Impairments

Acute Low Back Pain with Flatback Syndrome or Lumbago due to displacement of intervertebral disc -ICF Related (Referred) Lower Extremity Pain

Acute, Sub Acute, and Chronic Low Back Pain with Lumbago with Sciatica -ICF Radiating Pain

Acute or Sub Acute Low Back Pain with Low Back Pain/Low Back Strain/Lumbago Related Cognitive or Affective Tendencies

Chronic Low Back Pain with Low Back Pain/Low Back Strain/Lumbago Related Generalized Pain

J Orthop Sports Phys Ther. 2012;42 (April): A1-A57



- Diagnosis and Classification
 - Anatomical vs Symptomatic
 - TBC
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Medical Screening







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Reasons to Screen

- Quicker and Sicker
- Referral without Appraisal
- Progression of Time and Disease
- Direct Access
- Red and Yellow Flags
 - Yellow Flag-Caution, psychosocial indicators-referral may be indicated
 - Red Flag- Immediate attention, further screening questions, referral

Goodman, CC. Screening for medical problems in patients with upper extremity signs and symptoms. Journal of Hand Therapy. June 2010



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Goodman, CC. Screening for medical problems in patients with upper extremity signs and symptoms. Journal of Hand Therapy. June 2010

 The therapist is <u>not responsible for identifying</u> <u>the specific pathologic disease</u> underlying the clinical signs and symptoms present. However, the alert therapist who classifies groups of signs and symptoms in a review of systems will be more likely to <u>recognize a problem outside his or</u> <u>her scope of practice</u> and be equipped to communicate this unusual presentation to the physician."

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Include in the Systems Review (at minimum)

- Musculoskeletal
- Cardiovascular
- Neurological
- Integumentary
- Genitourinary
- Psychological
- Cognitive





DIFFERENTIAL DIAGNOSIS CPG

- Clinicians should consider diagnostic classifications associated with serious medical issue when...
 - 1. Findings are suggestive of <u>serious</u> medical or psychological pathology
 - 2. Activity limitations or impairments of body function and structure are <u>not consistent</u> with those presented in the diagnosis/classification section of these guidelines OR
 - Symptoms are <u>not resolving</u> with interventions aimed at normalization of the patient's impairments of body function



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Red Flags for the Low Back Region (varying levels of evidence):





- 1. Back Related Tumor
- 2. Cauda Equina Syndrome
- 3. Back-Related Infection
- 4. Spinal Compression Fracture
- 5. Abdominal Aneurysm



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Comparison of Pain Patterns

	Systemic pain	Musculoskeletal pain		
Onset	Recent, sudden	Sudden or gradual		
Description	Boring, deep	Achy, stiff		
Intensity	Variable	Variable		
Duration	Likely constant	Variable		
Pattern	Progressive, cyclic	Limited or painful mvt		
†ing factors	Less changeable	Altered by motion		
↓ing factors	Organ dependent	Rest, modalities		
Associated	Bil sxs. painless prox	Seldom except with		
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Screening for Yellow Flags

"Yellow flags are factors that increase the risk of developing, or perpetuating long-term disability and work loss associated with low back pain." (Kendall et al, 1997)



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Yellow Flags for Fear-Avoidance Beliefs

Attitudes and Beliefs	Behaviors		
 Belief that pain is harmful or disabling resulting in guarding and fear of movement. Belief that all pain must be abolished before returning to activity Expectation of increased pain with activity or work, lack of ability to predict capabilities Catastrophizing, expecting the worst Belief that pain is uncontrollable Passive attitude to rehabilitation 	 Use of extended rest Reduced activity level with significant withdrawal from daily activities Avoidance of normal activity and progressive substitution of lifestyle away from productive activity Reports of extremely high pain intensity Excessive reliance on aids (braces, crutches, etc.) Sleep quality reduced following the onset of back pain High intake of alcohol or other substances with an increase since the onset of back pain Smoking 		

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Will This Patient Develop Persistent Disabling Low Back Pain? Chou R, Shakelle P. JAMA. 2010;303(13):1295-1302

 The most helpful components for predicting persistent disabling low back pain were:

> maladaptive pain coping behaviors, nonorganic signs, functional impairment, general health status, and presence of psychiatric comorbidities.



Cassandra Rule

• Cassandra Rule: designed for physicians to screen for psychological factors.

• Went from 22 items, to 17 to now 5. Predictive of long term functional limitations and aggressive intervention and follow up is suggested.

<u>https://ac-els-cdn-</u>
 <u>com.proxy.hsl.ucdenver.edu/S0895435610000788/1-s2.0-</u>
 <u>S0895435610000788-main.pdf?</u> tid=227180aa-1d93-4588 <u>82a2-</u>
 <u>c85eb4c6b16e&acdnat=1539992203</u> 4aa31fa4e0c567cdf0d

e213c8fb0b5b0

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Cassandra Rule

C.E. Dissing et al. / Journal of Clorical Epidemiology 64 (2011) 54-66

Appendix E

Final questionnaire, scoring instructions, and interpretation of the five-item Cassandra predictive rule of long-term, severe, hack-related functional limitations

In the past month, how much were you distressed by:

	NOT AT ALL	A LITTLE BIT	MODERA- TELY	QUITE A BIT	EXTRE -MELY	
1-Feeling everything is an effort	0	1	2	3	4	DK
2-Trouble getting your breath	0	1	2	3	4	DK
3-Hot or cold spells 4-Numbness or tingling in parts	0	1	2	3	4	DK
of your body	0	1	2	3	-4	DK
5-Pain in your heart or chest	0	L i	2	3	4	DK

Coding: The 5-tiern Cassandru score is obtained by calculating the mean of non-missing items (one missing/DK item allowed; cut-off: 0.80). Patients whose score is < 0.80 are at low risk of long-term, severe, back-related functional limitations and may henefit the most from conservative treatment. Patients whose score is ≥ 0.80 are at high risk of long-term, severe, back-related functional limitations and may warrant more taggressive interventions and a closer follow-up. DK: Don't know.



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CLINICAL GUIDELINES

ANTHONY DELITTO, PT, PhD + STEVEN Z. GEORGE, PT, PhD + LINDA VAN DELEN, PT, PhD + JULE M. WHITMAM, PT, DSc GWENDOLYN SOWA, MD, PhD + PAIR, SHEKELLE, MD, PhD + THOMAS R. OENHINGER, DPT + JOSEPH J. GOOGES, DPT, MA

Low Back Pain

Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability, and Health from the Orthopaedic Section of the American Physical Therapy Association

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Low back pain with mobility deficits



Clinical Findings:

- Pain of recent onset (< 16 days)
- Low back, buttock, or thigh pain (proximal to knee)



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Clinical Findings:

- Restricted lumbar ROM and segmental mobility
- Symptoms reproduced with provocation of the involved lower thoracic, lumbar or sacroiliac segments







low back pain with movement coordination impairments

ICD category: spinal instabilities.







Clinical Findings

- Recurring low back and/or low backrelated lower extremity pain
- Presence of aberrant movements and pain during initiation or mid-range spinal movements
- Pain reproduced with provocation of the involved lumbar segment(s)

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Clinical Findings:







low back pain with related (referred) lower extremity pain

 ICD category: lumbago due to displacement of intervertebral disc.







Clinical Findings

- Acute low back pain and associated (referred) lower extremity pain
- Symptoms are often worsened with flexion activities and sitting



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Clinical Findings:

- Lateral trunk shift may be present
- Reduced lumbar lordosis
- Low back and lower extremity pain that can be centralized and diminished with specific postures and/or repeated movements
- "Responder" in McKenzie





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low back pain with radiating pain

ICD category: lumbar radiculopathy; sciatica

Clinical Findings:

- Radiating (narrow band of lancinating) pain in the involved lower extremity
- Lower extremity paresthesias, numbness, and weakness may be reported

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- Lower extremity radiating pain reproduced with lower limb tension tests/straight leg raising, and/or slump tests
- Signs of nerve root involvement may be present-DTR, myotomes, dermatomes



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Acute or Sub Acute Low Back Pain with Related Cognitive or Affective Tendencies



Clinical Findings: one or more of the following:

- 2(+) responses to Primary Care Evaluation of Mental Disorders screen and affect consistent with an individual who is depressed
- High FABQ scores and behaviors consistent with an individual who has excessive anxiety or fear
- High scores on the Pain Catastrophizing Scale and cognitive process consistent with rumination, pessimism, or helplessness.





Chronic low back pain with related

generalized pain

ICD categories:

Disorders of central nervous system Persistent somatoform pain disorder





Clinical Findings

- Low back and/or low back-related lower extremity pain with symptom duration for > 3 months
- Generalized pain not consistent with common physical impairment classification criteria

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Clinical Findings:

mental impairments co-existing with physical (pain) impairments – common co-existing conditions

- Depression (PHQ-2) (signs of fibromyalgia, demoralization)
- Fear-avoidance beliefs (FABQ) (signs anxiety, phobias, paranoia)
- Pain Catastrophizing (PCS) (signs of rumination, pessimism, helplessness)

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Categories Broken Down Further into Acute Sub Acute and Chronic





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Think/Pair/Share

- Name the categories that have the characteristic of symptom reproduction with provocation of the involved lower thoracic, lumbar or sacroiliac segments"
- What is the "key" examination test needed to classify an individual in the low back pain with related (referred) lower extremity pain category?



- David James PT, DPT, OCS, SCS, CSCS
- Sr. Instructor
- University of Colorado Physical Therapy Program
- Clinical Practice:
 - Cascade Sports
 Lakewood

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Lumbar Spine Imaging


Imaging and Low Back Pain

- Review some Evidence Regarding Imaging and the Lumbar Spine
- Review Current Imaging "Guidelines" for Low Back Pain
- Describe advantages and disadvantages of different imaging modalities
- Briefly review
 - · Radiograph views of lumbar spine
 - MRI sequences in lumbar region
 - CT scan

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Chapters with imaging privileges...Careful wh

- Wisconsin
- Colorado





Challenges we face...



Low back pain

- 35 y.o. Male history of repeated episodes of low back pain without radiating/radicular symptoms, previously managed with exercise and manipulation.
- Pain onset in the middle of the night after day of skiing.
- Otherwise healthy individual
 - No history of cancer, but family history of cancer
- First incident of lumbar pain in high school while playing football



Symptom Progression

- Day one
 - Severe localized left lumbar pain mild relief with side lying in partial fetal position
- Day two
 - Pins and needles and sensation of "warm water going down the leg"
- Day four
 - Onset of weakness, difficulty getting out of the car and foot drop during ambulation.

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Physical Exam

- Peripheralizes with both flexion and extension
- Mild contra lateral shift
- Near full ROM into forward bend backward bend limited to 50%
- Ankle DF, great toe extension and hip abduction weakness
- Symmetrical DTRs
- Negative SLR and Crossed SLR
- Peripheralizes with P-A pressure to L3-L5.



Low Back Pain

- Would you prefer to treat, treat and refer or just refer?
- Would you order imaging on this patient?
 - Why or Why not?



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What Imaging if any?

- X-ray ?
- CT Scan?
- MRI?
- Bone Scan?



What about this patient?

- 16.5 year old male baseball catcher with 2 D1 schools "interested" at his Sophomore year in HS
- History of localized lumbar pain without radicular or radiating symptoms
- Referred for Physical Therapy without imaging
 - 2 prior bouts of PT for 6-10 weeks each with full resolution of symptoms and full return to activity without limitation or disability.

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Physical Exam

- Full forward bend with aberrant movement on return, symmetrical side bending and rotation with minimal pain at end range
- Backward bend/extension painful at approximately 25% motion
- Positive prone instability test
- Poor TVA and multifidus recruitment and tonic hold
- Moderate to good lower abdominal strength
- Tight hamstrings, hip flexors and quadriceps bilaterally (growing 4-6 inches per year!!!)
- Negative neural screen bilateral lower extremity

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Low Back Pain

- Would you prefer to treat, treat and refer or just refer?
- Would you order imaging on this patient?
 - Why or Why not?



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What Imaging if any?

- X-ray ?
- CT Scan?
- MRI?
- Bone Scan?



Evolution of Evidence

- Examples over the course of time
- How evidence has informed a new approach to imaging
- Will the evidence change your decision making?



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23 Years Ago

Findings in Asymptomatic Persons

- 46 persons with symptomatic disc herniations matched for age, sex and occupational risk factors:
 - Presence of disc herniations in asymptomatic persons 76%.
 - Higher rate than previous studies which used unmatched asymptomatic subjects.
 - Symptomatic persons had more severe disc herniations (disc extrusions) than asymptomatic persons (35% vs. 13%).
 - Disc degeneration was not significantly different between groups (96% vs. 85%).
 - Primary group difference neural compromise (83% vs. 22%), (P < 0.0001).



No Low Back Symptoms



Boos et al, Spine, 1995

15 years ago...

- Rapid MRI vs. Radiographs in patients with LBP
 - 380 patients w LBP reporting to primary care
 - Patients randomized to either rapid MRI or plain radiograph groups
 - Results:
 - Nearly identical outcomes
 - Patients and physicians preferred MRI over radiography
 - Little or no additional benefit
 - Increased cost
 - · More likely to have surgery with MRI group

Jarvik JG et al, JAMA. June 4, 2003; 281:10; 2810-2818

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Spine

SPINE Volume 39, Number 17, pp 1433-1440 @2014, Lippincorr Williams & Wilkins

HEALTH SERVICES RESEARCH

OPEN

The Cascade of Medical Services and Associated Longitudinal Costs Due to Nonadherent Magnetic Resonance Imaging for Low Back Pain

Barbara S. Webster, BSPT, PA, *† YoonSun Choi, MA, * Ann Z. Bauer, MPH, * Manuel Cifuentes, MD, MPH, ScD*‡ and Glenn Pransky, MD, MOccH*

- Without guideline indication for MRI, more medical services were used, including surgery
- Cascade of medical services was related to MRI rather than:
 - Symptom severity
 - Pain indicators
 - Demographic characteristics



Advanced Imaging vs. PT

- Retrospective study -1 year of medical records
 - Advanced imaging as first referral
 - Higher degree of health care utilization
 - Average of \$4793 higher billing/charges
 - No significant difference Identified in outcomes
 - Minimal outcome data available in many cases

(Fritz et. al. 2015)

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And then there's this:

Do I need an MRI? Who owns the machine?

 Amongst patients receiving orthopedic spine care, the likelihood of having spinal <u>surgery</u> increases 35% if the surgeon owns an MRI machine.

> The Relationship between Low Back Magnetic Resonance Imaging, Surgery, and Spending: Impact of Physician Self-Referral Status

Health Services Research: 2011





Clinical Guideline

Diagnostic Imaging for Low Back Pain: Advice for High-Value Health Care From the American College of Physicians

Roger Chou, MD; Amir Qaseem, MD, PhD, MHA; Douglas K. Owens, MD, MS; and Paul Shekelle, MD, PhD,

For the Clinical Guidelines Committee of the American College of Physicians*

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Diagnostic Imaging for Low Back Pain: Advice for High-Value Health Care From the American College of Physicians

Chou 2011 Annals Int Med

- Imaging: indicated in LBP only if they have <u>severe</u> progressive neurologic deficits or signs or symptoms that suggest a serious or specific underlying condition.
- <u>Routine imaging is not associated with clinically</u> meaningful benefits <u>but can lead to harm and</u> <u>increased cost.</u>



Diagnostic Imaging for Low Back Pain: Advice for High-Value Health Care From the American College of Physicians

Chou 2011 Annals Int Med

- Addressing inefficiencies in diagnostic testing could minimize potential harms to patients and have a large effect on use of resources by reducing both direct and downstream costs.
- More testing does not equate to better care.
- Implementing a selective approach to low back imaging, as suggested by the ACP and APS guideline on low back pain, would provide better care to patients, improve outcomes, and reduce costs.

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Choosing Wisely Imaging Tests for LBP

 <u>http://www.choosingwisely.org/patient-</u> resources/imaging-tests-for-back-pain/





American Academy of Family Physicians

- Patient Ed/Resource
- When you MAY need imaging
 - · Weight loss that you can not explain
 - Fever over 102° F
 - · Loss of control of your bowel or bladder
 - · Loss of feeling or strength in your legs
 - Problems with reflexes
 - History of Cancer

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Most Up to DATE!!! Informed appropriate imaging for low back pain management: A narrative review

- Review Article August 2018
- Consolidated Information:
 - American College of Physicians
 - American College of Radiology
 - European Guidelines on imaging LBP (Wang et al. 2018 Journal of Orthopedic Translation)



diopathic (70%)	Mechanical low back or leg pain (27%)	Nonmechanical spinal conditions (about 1%)	Visceral disease (2%)
Lumbar strain, sprain	Degenerative disks and facets (10%)	Neoplasia (0.7%)	Disease of pelvic organs
	Herniated disc (4%) Spinal stenosis (3%) Osteoporotic compression fracture® (4%) Spondylolisthesis (2%) Traumatic fracture® (<1%) Congenital disease (<1%) Severe kyphosis Severe scoliosis Transitional vertebrae Spondylolysis Diskogenic low back pain Presumed instability	Multiple myeloma Metastatic carcinoma Lymphoma and leukaemia Spinal cord tumours Primary vertebral tumours Infection ^a (0.01%) Osteomyelitis Septic diskitis Paraspinous abscess Epidural abscess Shingles Inflammatory arthritis (often associated with human leucocyte antigen-B27) (0.3%) Ankylosing spondylitis Psoriatic spondylitis Reiter's syndrome Inflammatory bowel disease Scheuermann's disease (osteochondrosis) Pareri's disease f bone	Prostatitis Endometriosis Chronic pelvic inflammatory disease Renal disease Nephrolithiasis Pyelonephritis [®] Perinephric abscess [®] Aortic aneurysm Gastrointestinal disease Pancreatitis Cholecystitis Penetrating ulcer
Aodified from: Dey ^a Indicates condi (Wan	o RA, Weinstein JN. Low back pain. N E tions more likely to present as acute to α et al. 2018 Journal of	ingl J Med. 2001; 344:363—370. w back pain. Orthopedic Translation)

Most Up to DATE!!! Informed appropriate imaging for low back pain management: A narrative review

- · Potential Harms of Imaging in presence of LBP
 - 8 fold increase in surgical rates compared to matched patients
 - Higher degree of both cost and health care utilization
 - Higher propensity to progress to chronic pain due to patient perseveration on "pathology" identified on imaing

(Wang et al. 2018 Journal of Orthopedic Translation)



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Most Up to DATE!!!

Informed appropriate imaging for low back pain management: A narrative review

- No Evidence that selecting therapies/interventions based on imaging improves outcomes
- Recommendations:
 - LBP >6 weeks with conservative care and persistent radiculopathic symptoms
 - · LBP and severe progressive neurologic deficits
 - Signs and Symptoms consistent with serious or specific underlying condition
 - Cauda Equina: bowel- bladder, saddle parasthesia, bilateral neuro deficit
 - Cancer History of cancer and over 50

(Wang et al. 2018 Journal of Orthopedic Translation)

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What IF you do decide to order?

- Plain radiograph
 - Initial films for trauma
 - Suspect bone pathology
 - First Line of imaging
- MRI
 - Suspect specific soft tissue pathology related to exam
 Disc, ligament, muscle, nerve encroachment, etc
 - Suspect stress fracture type of bone pathology
 - Suspect infection, malignancy, etc....
- CT scan (Surgical planning)
 - Inconclusive plain radiograph
 - Need specific degree of bone pathology



AP Anatomy



Lateral Anatomy





Back to our patient cases

• Should we order imaging on our 35 year old with radicular symptoms?











STIR

Axial Sequence



Treatment Options

- Surgical intervention?
- Physical Therapy? What would this entail?
- Epidural injection?
- Pharmaceuticals?













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Finally CT Scan







Did Either Patient Need Imaging?



2018 Recommendations

- No Evidence that selecting therapies/interventions based on imaging improves outcomes
- Recommendations:
 - LBP >6 weeks with conservative care and persistent radiculopathic symptoms
 - · LBP and severe progressive neurologic deficits
 - Signs and Symptoms consistent with serious or specific underlying condition
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(Wang et al. 2018 Journal of Orthopedic Translation)

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Now That You Have ALL the Imaging...

- Does any of the imaging change your decision on whether to treat, treat AND refer, or Just refer?
- Will it change your treatment for either patient?
- Will the Clinical Guidelines BETTER inform you treatment than the imaging??



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10/23/2018

Peak Some Interest on Imaging????

Upcoming Marquette Challenge April 27th, 2019 "Physical Therapists Can Order Imaging in Colorado: What you NEED to Know!"

6 Hours of Category 1 Con Ed David A. James, PT, DPT, OCS, SCS and Scott Rezac, PT, DPT, OCS

Logistics of Referral Process for Imaging Advantages and Disadvantages of Different Imaging Modalities The ABCs of Radiographs Region Specific Imaging in Orthopedics

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Questions?









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Review of Categories







99

Low back pain with mobility deficits



Clinical Findings:

- Pain of recent onset (< 16 days)
- Low back, buttock, or thigh pain (proximal to knee)





Clinical Findings:

- Restricted lumbar ROM and segmental mobility
- Symptoms reproduced with provocation of the involved lower thoracic, lumbar or sacroiliac segments



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low back pain with movement coordination impairments

ICD category: spinal instabilities.







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Clinical Findings

- Recurring low back and/or low backrelated lower extremity pain
- Presence of aberrant movements and pain during initiation or mid-range spinal movements
- Pain reproduced with provocation of the involved lumbar segment(s)



Clinical Findings:



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Expansion to chronic Mvt Coordination Impairment (beyond CPG)

Presence of 1 or more of the following:

- Low back and/or low back-related lower extremity pain that worsens with sustained end-range movements or positions.
- 2. Lumbar hypermobility with segmental motion assessment.
- 3. Mobility deficits of the thorax and lumbopelvic/hip regions. (Regional impaired mobility)
- 4. Diminished trunk or pelvic-region muscle strength and endurance.
- 5. Movement coordination impairments while performing community/ work-related recreational or occupational activities. Delitto, VanDillen 2012





low back pain with related (referred) lower extremity pain

 ICD category: lumbago due to displacement of intervertebral disc.







Clinical Findings

- Acute low back pain and associated (referred) lower extremity pain
- Symptoms are often worsened with flexion activities and sitting



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Clinical Findings:

- Lateral trunk shift may be present
- Reduced lumbar lordosis
- Low back and lower extremity pain that can be centralized and diminished with specific postures and/or repeated movements
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- Lower extremity radiating pain reproduced with lower limb tension tests/straight leg raising, and/or slump tests
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Acute or Sub Acute Low Back Pain with Related Cognitive or Affective Tendencies



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generalized pain

ICD categories:

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- Low back and/or low back-related lower extremity pain with symptom duration for > 3 months
- Generalized pain not consistent with common physical impairment classification criteria

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Physical Therapy Program

Clinical Findings:

mental impairments co-existing with physical (pain) impairments – common co-existing conditions

- Depression (PHQ-2) (signs of fibromyalgia, demoralization)
- Fear-avoidance beliefs (FABQ) (signs anxiety, phobias, paranoia)
- Pain Catastrophizing (PCS) (signs of rumination, pessimism, helplessness)

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CPG-Examination

- Outcome measures (Patient Reported)
- Activity Limitation and Participation Restriction Measures (Performance)
- Physical Impairment Measures (Lumbar Exam)
- Mental Impairment Measures

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EXAMINATION – OUTCOME MEASURES

- Self-Report or subjective assessment of functional/disability level
 - SF-36
 - Oswestry Disability Index
 - Roland-Morris Disability Questionnaire
 - Quebec Back Pain Disability Scale
 - IRT/CAT



SF-36

- Great for overall Quality of Life
 - Limitation: long
- Options with more reasonable length, but less research
 - SF-12
 - SF-8

IT'S NOT HOW LONG LIFE IS BUT THE QUALITY OF OUR LIFE THAT IS IMPORTANT.

- ROGER DAWSON

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Oswestry Low Back Pain Disability Questionnaire

- Scored out of 100
- Higher scores=more disability



Revised Owestry Low Back Pain Disability Questionnaire

Please mark the ONE choice down E.S.C.B group that best threefore your problem right or

Disability Index Score: % _____

Other available options:



- Roland-Morris Disability Questionnaire
- Quebec Back Pain Disability Scale
- IRT (Item Response Theory/Computer Adapted Testing)
 - The answer to each question directs the next question
 - Unique to each person

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CPG-Examination

- Outcome measures (Patient Reported)
- Activity Limitation and Participation Restriction Measures (Performance)
- Physical Impairment Measures (Lumbar Exam)
- Mental Impairment Measures



EXAMINATION – OUTCOME MEASURES

- Outcome Measures (Physical Performance) Activity limitation and Participation restriction measures
 - Activity and Participation performance based measures e.g. gait speed, 5x sit to stand
 - Work Capacity Assessment (FCE)

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CPG-Examination

- Outcome measures (Patient Reported)
- Activity Limitation and Participation Restriction Measures (Performance)
- Physical Impairment Measures (Lumbar Exam)
- Mental Impairment Measures



Physical Impairment Measures

- Recommended Components of LBP Evaluation (Levels of evidence not clearly stated in CPG):
 - Lumbar AROM testing
 - Aberrant Movements during AROM
 - · Passive Hip IR, ER, Flexion and Ext motion tests
 - Segmental Mobility Testing
 - Pain Provocation with segmental mobility
 - Centralization Phenomenon
 - Prone Instability Test (PIT)
 - SLR testing
 - Slump testing
 - Trunk Muscle Power and Endurance Testing

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Lumbar AROM



- Flexion
- Extension
- Side bend right
- Side bend left
- Quadrants
- Seated rotation



Beyond CPG: Standing ROM with Overpressure



ROM Measurement Characteristics

- Bubble Goniometry
 - (ICC 0.86-0.95)¹
- Pain Provocation with AROM
 - (Kappa 0.51-0.76)²

¹Waddell et al. Spine 1992;17:617-628. ²Strender et al. Spine 1997;22:814-820.



AROM using inclinometers

- 2 or 1 inclinometry system
- Phone apps available
 - Works off bubble level system
- Lumbar spine
 - Sidebend and Flexion Extension: at T12-L1

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Single Inclinometer Method

- Line up at T/L Junction
- What are we measuring?
- Total motion (Lumbo-Pelvic-Hip)
 - Flexion
 - Extension
 - Side-bend right
 - Side-bend left





Goniometry: Flexion & Extension

- Flexion
 - Patient assumes standardized foot position, goniometer placed
 - Patient fully flexes trunk without bending knees.
 - Therapist records measurement at end-range to nearest degree
- Extension
 - From starting position, patient fully extends trunk without bending knees (therapist may support)
 - Therapist records
 measurement at end-range to
 nearest degree

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Goniometry: Side bending

- Side bending
 - Patient assumes standardized foot position, goniometer placed
 - Patient instructed to slide hand down thigh and fully side-bends trunk without bending knees.
 - Therapist records measurement at end-range to nearest degree
 - · Repeat on opposite side



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Double Inclinometer Method: T/L junction and sacrum (isolates lumbar motion)

- Flexion/Extension
- Consider accuracy advantages of 2 vs. 1
- What would measurement be for pictured individual with 1 inclinometer vs. 2?
- Could 1 inclinometer give false data?
- Practically, may not have 2...so interpret carefully

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What about "Visual Estimation" of Lumbar AROM?



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- What do you think?
- Available for cervical spine:
 - Intertester reliability: Poor, moderate measurement error which makes confidence in actual change poor
 - (Youdas, 1991)

Aberrant Movements during AROM testing

- Present/Absent
- · Reliability: moderate to good
- Defined:
 - presence of painful arc with flexion or return (midrange pain)
 - instability catch (deviates from sagittal mvt)
 - Gower sign (thigh climbing)
 - reversal of lumbopelvic rhythm (upon return from flexion, flexes knees and extend hips, shifting pelvis anteriorly as returns to standing)

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Aberrant motion VIDEO



Hip PROM (Extension, IR/ER, Flex)

 Note: IR/ER in hip flexion (sitting) and extension (prone) are not interchangeable





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Phone apps: Tiltmeter, iHandy level, Clinometer, Goniometer Pro



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Phone apps research examples

- Iphone ihandy level:
 - Kolber et al 2013
 - As reliable as bubble inclinometer, but not interchangeable
- Goniometer Pro Smartphone app:
 - Wellmon et al 2015
 - Smartphones are a viable substitute for inclinometer.

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Segmental mobility testing (PA in prone)

- Assessment of:
 - · Therapist sense of movement
 - 0=hypomobile, 1=normal, 2=hypermobile
 - Reliability: moderate to good with 0-2 scale
 Inscoe 1995
 - More specific assessment has been found to be highly unreliable (e.g. 0-7 or 0-9 scale)
 - Maher/Adams 1994, Binkley 1995, Hicks 2003
 - Pain provocation during mobility testing
 - Present/absent
 - Reliability: moderate to good with 2 option scale

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Spring Testing (PA Glides)

- Hypermobile
- Normal
- Hypomobile
- <u>AND</u>
 - Painful
 - Non-painful
 - Reproduction of familiar symptoms



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Prone Instability Test (PIT test)

- 1. Prone with pelvis/legs off table and resting on floor. PA pressure to lumbar segment with provocation of pain noted
- **2.** Active raise of legs off floor (hands hold side of table). PA pressure applied again
- Positive test: symptoms ↓ or resolve in 2nd position
- Limited diagnostic use as independent test, but can be used as test cluster to predict response to local stabilization/motor control approach Sabin

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Beyond CPG: SIJ

- Historical SIJ approach
- 1. Static positional palpation
 - Then added...
- 2. Motion palpation tests
- 3. Provocation tests



Evidence Based SIJ diagnosis

- History: indicators of SIJ pain source
 - Unilateral PSIS pain (Fortin finger test)
 - Pain may refer, but is RARE BELOW THE KNEE
 - SI pain generation much less likely in older individuals (Huijbregts)

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Provocation tests

- Using a cluster of SIJ provocation tests:
 - Increases inter-rater agreement to a clinically useful range and specific clusters
 - May help in establishing a course for further differential and treatment.

Sacroiliac joint examination cluster

- Laslett et al algorithm for diagnosing the SI joint as the pain generator
 - 2 of 4 positive **provocation** tests are the best predictors (+LR of 4.0)
 - 1. Distraction
 - 2. Compression
 - 3. Thigh thrust
 - 4. Sacral thrust

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Distraction test (Gapping test):

- Supine with the affected side close to the side of the table.
- Standing on the affected side, the examiner applies cross-armed pressure to the anterior superior iliac spines (ASIS).
- The examiner exerts/sustains 30 second pressure in a dorsal and lateral direction with the arms.
- Percentages of agreement between therapists: 94% and 88.2% for iliac gapping (Potter and Rothstein, Laslett and Williams).
- Sensitivity 60%/Specificity 81%. (Laslett et al)





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Compression test (Approximation test) (can be performed supine pushing on iliac crests)

- Sidelying with the affected side up, hips flexed to ~y 45°, and knees flexed to ~ 90°.
- Examiner stands behind the subject and places folded hands over the anterior edge of the iliac crest and applies/sustains for 30 sec a downward pressure.
- Percentages of agreement between therapists 76% and 88.2% for iliac compression (Potter and Rothstein, Laslett/Williams).
- Sensitivity 69%/specificity 69%.(Laslett et al)







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Thigh Thrust test (Posterior Shear test, sometimes called the POSH):

- Supine with contralateral leg extended.
- Standing at the affected side, the examiner flexes ipsilateral leg to ~ 90° hip flexion while the knee remains relaxed.
- Examiner slightly adducts the femur and encloses the knee with folded hands. Examiner applies a graded force through the long axis of the femur, which causes anterior-to-posterior shear to the sacroiliac joint on the same side.
- Commonly, the hand is placed under the sacrum to increase the shear force
- Inter-rater agreement of 94.1% (Laslett and Williams)
- Sensitivity of 88%/specificity of 69%. (Laslett et al)





Sacral Thrust:

- Subject is prone and the examiner applies a strong downward pressure to the sacrum at S3 repeatedly (variably described, but up to 6 times)
- A positive test is a reproduction of the patient's familiar pain.
- Sensitivity 63%/specificity 75%. Laslett et al





Quick SIJ Summary

- PSIS pain with potential referral that is unusual below the knee
- Unusual in older patients
- A comprehensive examination consisting of repeated movements and a cluster of SIJ tests provides excellent accuracy in the diagnosis of SIJ-related pain
- 2 of 4 positive **provocation** tests are the best predictors (+LR of 4.0)





Centralization/ Peripheralization during movement testing

- Absent/present with good reliability
- Movements: repeated movements in systematic fashion
 - Standing: flexion/extension
 - Standing, supine or prone: laterally shift pelvis/trunk in frontal plane





Judgments of Centralization during Movement Testing

1) Baseline assessment of symptoms

2) Start with suspected most provocative movement first

- Active or passive attempts
- Multiple repeated motions to attempt to peripheralize (single or repeated)
- Then attempt to centralize symptoms





Shift Correction Trumps Centralization



- Attempt shift correction first
 - Standing
 - Supine
 - Prone
 - Traction



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Classification in the presence of LE sx

- Can be confusing and overlap as the CPG is written
- Our interpretation...
 - #1: nerve root findings, possible +SLR, centralization attempts are effective, centralization is appropriate intervention moving forward (called....)
 - #2: nerve root findings, possible +SLR, centralization attempts fail, appropriate intervention is traction (called....)



SLR (dural/lower limb mobility sign)

- Supine: passive LE raise (Does NOT include DF)
- Positive test: Present/Absent LE radiating/ Radicular pain
- Inclinometer or Goniometer



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Beyond CPG: Neurodynamic Testing



- Challenge the nervous system
- Multi-joint movements of limbs and/or trunk
- Positive response =
 - Patient's familiar symptoms are reproduced
 - Familiar symptoms provoked by moving segment remote from area
 - Asymmetry noted

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Neurodynamics: Peripheral nerve sensitization

- SLR with addition of:
 - Peroneal nerve (fibular nerve) PIP
 - Plantarflexion/inversion
 - Sural nerve SID
 - Dorsiflexion/inversion
 - Tibial nerve TED
 - Dorsiflexion/eversion/pronation



Slump Test

- Sequential introduction (then reverse removal) of:
 - Trunk flexion
 - Cervical flexion
 - Knee extension
 - Ankle dorsiflexion
- · Absent/presence of LE symptoms, with good reliability
- Judgments made for
 - Reproduction/relief of symptoms when cervical spine is extended, or nerve tension released by one or more of LE components

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Slump Test

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Prone Knee Bend (PKB)



Hip Mobility



Femoral Nerve Stretch

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Trunk Muscle Power/Endurance

- Selection of test is dependent on level of conditioning and symptom behavior
- CPG is rather simplistic
 - Performance of Transverses Abdominis using pressure cuff
 - Timed holds of global trunk flexors, trunk extensors, lateral abdominals, hip abductors, and hip extensors

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Transverses Abdominis (supine or prone)





Strength Assessment: Trunk Flexors

- Supine:
- Examiner elevates both of the patient's extended legs to the point at which the sacrum begins to rise off the table.
- Instructed to maintain contact of the low back with the table while slowly lowering legs to the table
- Examiner observes and measures when the lower back loses contact with the tabletop.
- More like to have chronic LBP if demonstrate anterior pelvic tilt at:
 - 50° in males
 - 60° in females
- 100 healthy volunteers (50 men, 50 women; age range, 18–29y
- men able to lower their legs on average to 15.4°±2.3° from a horizontal reference and women able to lower their legs on average to 37.0°±3.5°



Krause DA. Abdominal muscle performance as measured by the double leg-lowering test. *Arch Phys Med Rehabil.* 2005;86:1345-1348.



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Strength Assessment: Trunk Extensors

- Prone, hands by sides.
- Instructed to extend the spine, raise the chest off the table to 30° and hold
- Timed until can no longer hold the position.
- Normal hold: 146 seconds
- · LBP more likely if:
- Males unable to maintain 31 seconds
- Females unable to maintin 33 seconds



McGill et al. Arch Phys Med Rehabil. 1999 Aug;80(8):941-4. • (+LR = 4.05-6.5; -LR = 0.24-0.02) with good reliability (ICC = 0.89-0.90).

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Strength Assessment: Lateral Abdominals

- Sidelying with hips in neutral, knees flexed to 90°, and resting the upper body on the elbow.
- Asked to lift the pelvis off the table and to straighten the curve of the spine without rolling forward or backward.
- Held and timed until can no longer maintain the position.
- Normal hold times are ~95 seconds
- Lateral abdominal strength has been measured in healthy controls and found reliable (ICC = 0.97).



McGill et al. Arch Phys Med Rehabil. 1999 Aug;80(8):941-4.

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Strength Assessment: Hip Extensors

- Supine with knees flexed to 90° and the soles of the feet on the table.
- Instructed to raise the pelvis off the table to a point where the shoulders, hips, and knees are in a line.
- Held and timed until the position can no longer be maintained.
- Good reliability (ICC = 0.84).
- Mean duration:
 - with LBP = 76.7 seconds without LBP=172.9 seconds



Schellenberg et al. *Am J Phys Med Rehabil.* 2007;86:380-386.

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Lumbar/hip movement

- Relative motion hip and lumbar spine
- Heel rock back



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Lower Extremity Dissociation

- Association between alterations in hip ROM and lumbosacral region pain
 - Cibulka et al. Spine '98
 - Porter JL and Wilkinson A. Spine '97
 - Mellin G. Spine '88
- Association between hip ROM and response to lumbosacral region manipulation
 - Flynn et al. Spine '02. Childs et al. Ann Int Med '04

Movement observation/Motor control tests

- Most reliable tests
 - Luomajoki 2007
- A. pelvic tilt for extension dysfunction
- B. one leg stance for rotational dysfunction
- C. seated hamstrings test for flexion dysfunction

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pelvic tilt for extension dysfunction

 Test protocol Dorsal tilt of pelvis. Actively in upright standing. Correct – Actively in upright standing (Gluteus activity); keeping thoracic spine in neutral, lumbar spine moves towards Fx. B Not correct Pelvis doesn't tilt or low back moves towards Ext./No gluteal activity/compensatory Fx in Thx. Rating protocol: As patients did not know the tests, only clear movement dysfunction was rated as "not correct". If the movement control improved by instruction and correction, it was considered that it did not infer a relevant movement dysfunction.



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Single leg stance for rotational dysfunction

• Test protocol -One leg stance.





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seated hamstrings test for flexion dysfunction



Test protocol – Sitting knee extension. Upright sitting with corrected lumbar lordosis; extension of the knee without movement (flexion) of low back A. Correct – Upright sitting with corrected lumbar lordosis; extension of the knee without movement of LB (30–50° Extension normal). B Not correct Low back moving in flexion. Patient is not aware of the movement of the back. Rating protocol: As patients did not know the tests, only clear movement dysfunction was rated as "not correct". If the movement control improved by instruction and correction, it was considered that it did not infer a relevant movement dysfunction.

Beyond CPG: some additional timed tests





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Plank progression holds




Think/Pair/Share on Exam

- The presence of aberrant movement may indicate that the patient fits into the category of:
- What other findings may also indicate that the patient may fit into this category?



Assessing specific components of the biopsychosocial model



CPG-Examination

- Outcome measures (Patient Reported)
- Activity Limitation and Participation Restriction Measures (Performance)
- Physical Impairment Measures (Lumbar Exam)
- Mental Impairment Measures



EXAMINATION – Mental Impairment Measures

- Depression-2 question screen
- FABQ-Fear Avoidance Beliefs Questionnaire
- Pain Catastrophizing
- OMPQ
- STarT Back Screening Tool

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2 question Screening Instrument for Depression

- Screening tool: positive result should lead to a diagnostic work up for depression
- During the past month have you been feeling down, depressed or hopeless?
- During the past month have you been bothered by having little interest or pleasure in doing things?
 - If the patient answers yes to either question:
 - Is this something with which you would like help?
- Sn: 96-97%, Sp: 57-67%



Arroll et al 2003, Spitzer et al 1994, Whooley et al 1997



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Fear-Avoidance Beliefs Questionnaire (FABQ)

- 16-item questionnaire designed to quantify fear avoidance beliefs
- Useful in patients with neck, LBP, shoulder?
- 2 sub-scales scored from 0-6
 - 7-item scale to measure beliefs about work
 - 4-item scale for beliefs about physical activity.
- Presence of avoidance behavior associated with increased risk of prolonged disability and work loss

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Catastrophizing





Pain Catastrophizing Scale (Sullivan)

- 13 questions on 0-4 scale
- Examples:

	I become afraid that the pain will get worse	0	1	2	3	4
	I keep thinking of other painful events	0	1	2	3	4
	I anxiously want the pain to go away	0	1	2	3	4
	I can't seem to keep it out of my mind	0	1	2	3	4
	I keep thinking about how much it hurts	0	1	2	3	4
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STarT Back Screening Tool

- 9 items with good reliability and validity
- Assesses factors previously found to be strong indicators of a poor prognosis:
 - physical (leg pain, co-morbid pain, and disability)
 - psychosocial (bothersomeness, catastrophizing, fear, anxiety, and depression)
- Score Interpretation
 - Low Risk: less than or = to 4
 - Medium: greater than or = to 4 total but 4 or less on psychosocial
 - High: greater than or = to 4 on both total and psychosocial
- Aug 2016 PTJ: not ready to use with all populations, despite insurance companies going there



STarT Back Screening Tool (Keele Univ)

nking about the last 2 we		(0)	(1)			
1. My back pain has spre-						
2. I have had pain in the shoulder or neck at some time in the last 2 weeks				0		
3. I have only walked sh		0				
4. In the last 2 weeks, I hu	an C	0				
5. It's not really safe for a person with a condition like mine to be physically active			6 - C			
6. Worrying thoughts I		0	а.			
7. I feel that my back pain is terrible and it's never going to get any better				9		
8. In general I have not enjoyed all the things I used to enjoy				0		
Ref at all	me has your back pain be Slightly	en in the last 2 weeks? Moderately	Very much	- 6	trendy	
0	9				0	
0	0	1 0	1		4 Secto Starral Marris Sciences	

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Audience

 Do you have a mental health professional to whom you refer?







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CLINICAL GUIDELINES

ANTHONY DELITTO, PT PhD + STEVEN Z, GEORGE, PT, PhD + LINDA VAN DILLEN, PT, PhD + JULIE M, WHITMAN, PT, DSc GWENDOLYN SOWA, MD, PhD + PAUL SHEKELLE, MD, PhD + THOMAS R, DEMINIDER, DPT + JOSEPH J, GODGES, DPT, MA

Low Back Pain

Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability, and Health from the Orthopaedic Section of the American Physical Therapy Association

J Orthop Sports Phys Ther. 2012;42(4):A1-A57. doi:10.2519/jospt.2012.0301

available free access at: www.jospt.org www.orthopt.org, and www.guidelines.gov

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Intervention



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Intervention

- Manual Therapy
- · Centralization and directional preference
- LQ Nerve mobilization procedures
- Traction
- Trunk Coordination/Strengthening and Endurance Exercises
- · Progressive endurance ex and fitness activities
- Patient Education and Counseling







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Low back pain with mobility deficits

ICD category: lumbosacral segmental/somatic dysfunction.



Primary management strategy:

- Manual therapy
- Exercises for spinal mobility
- Patient education to encourage return to or pursuit of active lifestyle



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Primary management strategy:

- Manual therapy
- Exercises for spinal mobility
- Patient education to encourage return to or pursuit of active lifestyle





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Focus on preventing recurring LBP episodes through the use of:

- (1) therapeutic exercises that addresses coexisting coordination impairments, strength deficits, and endurance deficits
- (2) education that encourages the patient to • pursue or maintain an active lifestyle



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low back pain with movement coordination impairments

ICD category: spinal instabilities.



Primary management strategy:

- Neuromuscular reeducation/dynamic (muscular) stability in mid-range positions during daily activities
- Manual therapy procedures and therapeutic exercises to address identified thoracic spine, ribs, or hip mobility deficits







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- Therapeutic exercises for trunk and pelvic region muscle strength and endurance deficits
- Community/work reintegration training in pain management strategies while returning to community/work activities



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low back pain with related (referred) lower extremity pain

• ICD category: lumbago due to displacement of intervertebral disc.



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Primary management strategy:

- Therapeutic exercises, manual therapy, or traction procedures that promote centralization and improve lumbar extension mobility
- · Patient education in positions that promote centralization







low back pain with radiating pain

ICD category: lumbar radiculopathy; sciatica

Clinical Findings:

- Radiating (narrow band of lancinating) pain in the involved lower extremity
- Lower extremity paresthesias, numbness, and weakness may be reported



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Primary management strategy:

- Nerve mobility exercises to improve the mobility of central and peripheral neural elements
- Manual or mechanical traction







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Primary management strategy:

- Patient education in positions that reduce strain or compression to the involved nerves root(s) or nerves
- Manual therapy to mobilize the articulations and soft tissues adjacent to the involved nerve root(s) or nerves that exhibit mobility deficits





Acute or Sub Acute Low Back Pain with Related Cognitive or Affective Tendencies





Primary management strategy

- Patient education and counseling to address specific classification exhibited by the patient (ie, depression, fear-avoidance, pain catastrophizing)
- Progressive return to activity or work
- Progressive exercise and activity tolerance training

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Chronic low back pain with related generalized pain

ICD categories: Disorders of central nervous system Persistent somatoform pain disorder



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What about chronic LBP (cLBP)? (Beyond CPG)



All systematic reviews on PT for cLBP

- Minimal to moderate improvements after a "course" of PT (12 visits) in the short term
- Improvements long term are rarely better than no treatment
- In particular, a lack of effectiveness with
 - Typical HEP approach (did not show meaningful improvements in pain and disability)

JOSPT Editorial April 2015 Beattie and Silfies





What about chronic LBP?

2. Patient preference is fundamental to the physical therapy program.

- Keep patient preference at the center
- Marry PT goals for patient with patient preference

JOSPT Editorial April 2015 Beattie and Silfies



What about Chronic LBP?

3. Develop and maintain LONG TERM therapeutic alliance with long term follow-up visits

- May need periodic "tune-ups" with trusted PT to keep on track
- May need system changes to minimize the "episodic" treatment approach
- Symptom variation is typical, not to be feared
- Focus on reconceptualization of the role of PT as provider of support and empowerment

JOSPT Editorial April 2015 Beattie and Silfies

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Primary management strategy:

- Patient education and counseling to address specific classification exhibited by the patient (ie, depression, fear-avoidance, pain catastrophizing)
- May need concurrent mental health referral





Primary management strategy:

 Low intensity, prolonged (aerobic) exercise activities



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INTERVENTIONS - MANUAL THERAPY

- Acute: Thrust manipulative procedures to reduce pain/disability in patients with mobility deficits and acute low back and back-related buttock or thigh pain (above knee).
- **Subacute/Chronic:** Thrust manipulative and non-thrust mobilization procedures to improve spine and hip mobility and reduce pain and disability in patients with LBP and back-related lower extremity pain.

Manual Therapy for the Lumbar Spine



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What is Manual Therapy?

Mobilization	Passive techniques designed to restore full painless joint function by rhythmic, repetitive passive movements to the patient's tolerance, in voluntary and/or accessory ranges.
Manipulation	An accurately localized or globally applied; single, quick, and decisive movement of small amplitude, following a careful positioning of the patient.
Muscle Energy Techniques	A manually assisted method of stretching/mobilization where the patient actively uses their muscles, on request, while maintaining a targeted preposition, against a distinctly executed counterforce.
Passive Stretching	A passive approach that lengthens targeted muscle and soft tissue by stretching a joint within a planar or multiplanar direction.
Soft Tissue Mobilization	Manual technique associated with massage or deep tissue work that is associated with manually manipulating deep tissue such as muscle.

Cook C. Orthopaedic Manual Therapy. An Evidence Based Approach. Prentice Hall; Upper Saddle River, NJ:2007.



Why Manual Therapy?

Construct	Description
Biomechanical Changes	Range related changes, or changes in actual joint biomechanical behavior that is measurable as increased range of motion.
Muscle Reflexogenic Changes	Changes in muscle tension or overlying reflexive spasm associated with use of manual therapy.
Neurophysiological Changes	Changes in pain tolerance through alteration in central mediated activity.
Physiological Changes	Psychological changes associated with patient satisfaction, placebo, or expectation.

Cook C. Orthopaedic Manual Therapy. An Evidence Based Approach. Prentice Hall; Upper Saddle River, NJ:2007.

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Effects of Mobilization/Manipulation

- **Provides sensory input** via mechanoreceptors which can help modulate pain and muscle tone
- **Improves function** by addressing impairments such as pain, decreased ROM and faulty movement patterns
- Reduces the sensitization of the segmental DRGs
- Elevated plasma ß-endorphin levels in normal subjects after a manipulation
- Increased pressure pain thresholds (PPT)

Bialosky J. Mechanisms of Manual Therapy in the treatment of Musculoskeletal pain. Man Ther 2009. Tullberg et al. Spine 1998; 23:1124-1128 Sturesson et al. Spine. 1989;14:162-5



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How Does Spinal Manipulation Work?

Pain Science

- Psycho-physiological
 - Patient expectations
- Neuro-physiological
 - Stimulation of spinal afferents
 - Enhanced motorneuron excitability
 - Reflex post-synaptic inhibition
 - Inhibition of nocioceptive transmission via dorsal horn cells

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Neurophysiological Evidence Summary





Step by Step on this diagram

 <u>http://www.raynersmale.com/blog/2015/7/10/chai</u> <u>n-reaction-the-neurophysiological-mechanism-</u> <u>of-manual-therapy</u>



Biomechanical (Theory only!)

- Relieve blood flow interference (Still) or nerve compression (Palmer) due to vertebral displacement
- Break "fixations" to improve ROM and reduce pain (Hartmann)
- Correct "tight" vertebral segments (Grieve)
- Shift an intervertebral disc fragment (Cyriax)
- Restores joint play and mobility (Lewit)

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2018 Manip and Mob for **chronic** LBP Systematic Review and Meta-analysis

- Moderate-quality evidence that manipulation and mobilization are likely to reduce pain and improve function for patients with chronic low back pain
 - Manipulation appears to produce a larger effect than mobilization.
 - Both therapies appear safe.
 - Multimodal programs may be a promising option
 Coulter, 2018



Systematic Review-Mechanism of Action Spinal Mobilization

- Findings suggest involvement of an endogenous pain inhibition system mediated by the central nervous system
- This is yet to be investigated directly. Lascurain-Aguirrebena, 2017, Spine



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Lab (some key manipulation/mobilization techniques)

- Supine lumbosacral regional manipulation
- Side-lying lumbar neutral gapping manipulation
- Side-lying lumbar mobilization
- Prone lumbar central and unilateral P/A
 - Neutral
 - Flexion bias
 - Extension bias



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Lumbopelvic Regional Manipulation



Treating the Right Side

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- Translate the pelvis towards you and maximally side-bend the patient's lower extremities and trunk to the right
- Without losing the right sidebending lift & rotate the trunk so the patient rests on their left shoulder
- Contact the patient's right ASIS with your left hand
- Grasp the top shoulder and scapula with your right hand and rotate the trunk to the left while maintaining the right side-bending
- Once the right ASIS starts to elevate, perform a smooth thrust in an anterior to posterior direction
- · Reassess symptoms and impairments

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Lumbosacral Regional Manipulation Alternate Operator Arm Position



- Translate pelvis toward you and maximally side-bend the patient's lower extremities and trunk to the right
- Thread your right forearm through the patient's arms. Rest your fingertips on the patient's sternum or the table. Stand upright and rotate the trunk to the left (maintain the right side-bending)
- Contact the patient's right ASIS with your left hand. When the ASIS rises from the table, perform a smooth thrust in an anterior to posterior direction
- Reassess symptoms and impairments



Neutral "Gapping" Mobilization or Manipulation



Gapping Right L4-L5

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- Flex the top leg until you first begin to palpate motion at L4-L5 interspace; place the patient's foot in the popliteal fossa as shown
- Grasp the patient's left arm and shoulder and induce left sidebending & right rotation until you begin to palpate motion at the L4-L5 interspace
- Place your thumb on the side of the L4 SP & position the patient's arms around your right arm
- While maintaining your setup log roll the patient towards you
- · Come in close to pt's body
- While monitoring the side of the L5 SP, use your left arm and trunk to induce a high velocity, low amplitude (HVLA) thrust in anterior direction
- Reassess symptoms and impairments

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Extension (Closing) Manipulation





- Grasp the trunk and translate towards you until you localize the extension to the L4-L5 motion segment
- Rotate the patient's body until you begin to palpate motion at the L4-L5 motion segment
- Lift lower part of the table to help induce sidebending
- Place your thumb or finger on the side of the L4 SP & position the patient's arms around your arm as demonstrated
- · Log roll the patient towards you
- With your forearm induce a high velocity, low amplitude thrust in anterior and cephalward direction
- Reassess symptoms and impairments
- TIP: You can also perform Grade III-IV with MET in this position

Thoraco-Lumbar Junction Manipulation



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Put a towel at the TL junction Flex up to the TL junction, then pull the patient's bottom arm DOWN towards their feet to flex down from above Perform a high-velocity, endrange, left-rotational force to the upper lumbar spine on the lower thoracic in a left side-lying, left lower thoracic lumbar side-bent position.

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Central PA Mobilization in Neutral



- Place the ulnar aspect of your right hypothenar eminence (just distal to your pisiform) over the spinous process (SP)
 Support your right hand with your opposite hand
 - Keep your elbows stiff and use your body to deliver an oscillatory mobilization force to the vertebra

 Reassess symptoms and impairments <u>Tips</u>:

- Your chest should be directly over your hands to ensure a direct PA force
- For maximal patient comfort, progressively oscillate in and out of the desired depth of mobilization.
- Optimize the intervention by adjusting the direction of the mobilization force or by changing the patient position

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Central PA Mobilization in Flexion



- Place the ulnar aspect of your right hypothenar eminence (just distal to your pisiform) over the spinous process (SP)
- Support your right hand with your opposite hand
- Keep your elbows stiff and use your body to deliver an oscillatory mobilization force to the vertebra
- Progressively position the patient into more flexion or into side-bending away from the side you are trying to "open"
- Reassess symptoms and impairments <u>Tips</u>:
 - Your chest should be directly over your hands to ensure a direct PA force.
 - For maximal patient comfort, progressively oscillate in and out of the desired depth of mobilization.
 - Optimize the intervention by adjusting the direction of the mobilization force or by changing the patient position

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Central PA Mobilization in Extension



- Place the ulnar aspect of your right hypothenar eminence (just distal to your pisiform) over the spinous process (SP)
- Support your right hand with your opposite hand
- Keep your elbows stiff and use your body to deliver an oscillatory mobilization force to the vertebra
- Progressively position the patient into more extension or into side-bending towards the side you are trying to "close"
- Reassess symptoms and impairments

Tips:

- Your chest should be directly over your hands to ensure a direct PA force.
- For maximal patient comfort, progressively oscillate in and out of the desired depth of mobilization.
- Optimize the intervention by adjusting the direction of the mobilization force or by changing the patient position

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Lumbar Prone Unilateral PA Mobilization with Straight Leg Raise



- Patient prone, leg of the treatment side off the plinth with the foot on the floor
- You will have to adjust plinth height for patient comfort
- Have patient flex the hip until just the onset of leg symptoms
- Apply graded unilateral PA mobilizations to the lumbar segment that changes leg pain
- Repeat graded mobilizations for 30 seconds
- Reassess, and if able, have patient flex the hip a bit more to new onset of symptoms
- Repeat graded unilateral PA mobilizations for 30 seconds
- Continue in this manner for 3 bouts of 30 seconds
- Assess pain response before, during and after this technique

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Regional Interdependence

- Hip and Lumbar Spine Physical Examination Findings in People Presenting With Low Back Pain, With or Without Lower Extremity Pain
- Patients with LBP and positive hip examination findings have more pain and worse function compared to patients with LBP but without positive hip examination findings.





Prather, 2017 University of Colorado Anschutz Medical Campus





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Closing in Supine: Pelvic Rock







- Anteriorly tilt the pelvis in an on and off manner to mobilize the spine into extension
- Reassess symptoms and painful or restricted activities or movements after performing the self mobilization Note:
- Adding left sidebending &/or left rotation may facilitate more closing on the left (and vice versa for the right)






Opening in Supine: Pelvic Rock

- Posteriorly tilt the pelvis to flex the spine
- Reassess symptoms and painful or restricted activities or movements after performing the self mobilization

Note:

- The therapist may use verbal or tactile cues to train the patient to mobilize the appropriate region
- Placing a small pillow or towel roll under the distal buttock may be used to bias the pelvis / spine into

more flexion

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 Lie on the left side, stabilize the right knee with the left hand, hold onto the lower ribs with the right hand and rotate the trunk to the right until a stretch is felt along the right side of the lower back

Rotation in Sidelying

- Adjustment of the degree of hip flexion and amount of rotation performed can help to localize the mobilization forces to a specific region or level of the spine
- A pillow under the trunk and/or more hip flexion may help to facilitate more flexion or "opening"







- Not covered in CPG as an isolated technique
- Primarily at level of expert and limited, lower quality studies, there are times when some approaches may have face validity
 - Myofascial Techniques
 - Stretching
 - Dry Needling

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INTERVENTIONS – CENTRALIZATION AND DIRECTIONAL PREFERENCE EXERCISES AND PROCEDURES

- Repeated movements, exercises, or procedures to promote centralization to reduce symptoms in patients with acute low back pain with related (referred) lower extremity pain.
- Repeated exercises in a specific direction determined by treatment response to improve mobility and reduce symptoms in patients with acute, subacute, or chronic low back pain with mobility deficits.

CPG

- Repeated motions: can be effective in acute, subacute and chronic LBP to promote centralization. Direction is patient dependent.
- Multicenter RCT looking at centralization via extension vs. lumbopelvic strengthening alone. Noted better outcomes with extension as long as 6 months out. (Browder 2007)
- RCT: pt education and McKenzie approach of visiting positions for centralization outperformed the use of mobilization/manipulation and general pt education at 2 months and 12 months. (Peterson 2011)

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Definitions

- <u>Centralization</u>: Distal pain "centralizes" toward the spine, moving proximally. This can cause an increase in LBP temporarily, but is considered a + sign, strongly correlated with excellent outcomes
 - +LR 2.8 for indicating a disc lesion
- <u>Peripheralization</u>: Occurs when pain moves distally based on movement exam
- At least 2 studies have illustrated directional movement of the nucleus pulposus with flexion (posteriorly) & extension (anteriorly)
 - (Fazey et al, 2006; Brault et al, 1997)



Biasing exercise/activity

- If they centralize with extension, exercise should bias towards extension, as should activity
 - E.g. have them walk for aerobic exercise
- If they centralize with flexion, bias flexion
 - E.g. have them use stationary bike for aerobic exercise

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"End Range is where the magic happens..."





INTERVENTIONS – FLEXION EXERCISES

 Clinicians can consider flexion exercises, combined with other interventions such as manual therapy (spine/hip), strengthening exercises, nerve mobilization procedures, and progressive walking, for reducing pain and disability in older patients with chronic low back pain with radiating pain.

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FLEXION EXERCISES

• (Weak evidence): Therapists can consider flexion exercises along with manual therapy, strengthening, nerve glides, and progressive walking for reducing pain in older patients with chronic LBP and radiating LE symptoms.



Final thought on centralization

- Once LE symptoms are controlled, be sure to reintroduce opposite motion if it can be done without again peripheralizing
- Don't leave them thinking they can never flex (or extend again)

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INTERVENTIONS – TRACTION

- Preliminary evidence: subgroup of patients with signs of nerve root compression along with peripheralization of symptoms or a positive crossed straight leg raise will benefit from intermittent lumbar traction in the prone position.
 - Traction category TBC: unable to centralize with repeated motions
- Moderate evidence that clinicians should NOT utilize intermittent or static lumbar traction for reducing symptoms in patients with acute or subacute, nonradicular low back pain or in patients with chronic low back pain.

Assessment of variability in traction interventions for patients with low back pain: a systematic review

- 37 RCTs reviewed: the method was all over the placemechanical, auto, manual, gravitational, aquatic
- As were patients-acute, sub-acute, chronic LBP; with or without sciatica.
- And the parameters: types of traction force, rhythm, session duration and treatment frequency
- Conclusion: The variability may call into question the conclusion that lumbar traction has little no or value on clinical outcomes.
- Variability emphasizes the need for targeted delivery methods of traction that match appropriate dosages with specific subgroups of patients with LBP.

Alwaly, 2018

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The Effectiveness of Mechanical Traction Among Subgroups of Patients with Low Back Pain and Leg Pain (RCT)

- N=120; + nerve root compression with Low Back and LE pain
- 12 min of **prone static traction**, intensity of 40% to 60% of body weight.
- Traction did not result in significant improvements in pain or disability
- Patients all improved in disability and pain over a 6 week period
- Extension biased program did include extension biased ex and manual therapy Thackeray et al, 2018



Supine or Prone? A Randomized Controlled Trial

- Addition of traction to PT treatment in the prone position resulted in larger immediate improvements in terms of pain and disability than supine.
- · Results suggest prone may be better.



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INTERVENTIONS – LOWER-QUARTER NERVE MOBILIZATION PROCEDURES

- Lower-quarter nerve mobilization procedures to reduce pain and disability in patients with subacute and chronic low back pain and radiating pain
- Should not be used with acute radicular symptoms
- (Weak evidence)



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Neural Mobilization



Neural tissue (brain, spinal cord and nerves) are surrounded by connective tissue that can develop tension or tightness which can contribute to symptoms such as numbness, tingling, radiating pain or weakness

 Intraneural and Extraneural pathology (fibrosis, entrapment, inflammation) can impact the nerves ability to
function normally

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Neurodynamics



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Effects of lower body quadrant neural mobilization in healthy and low back pain populations: A systematic review and metaanalysis



- + effects from the application of Neural Mobilization to the lower body quadrant.
- Neural Mobilization shows large effects on pain and disability in people with LBP.

Neto, 2017



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The Effectiveness of Neural Mobilization for Neuromusculoskeletal Conditions: A Systematic Review and Meta-analysis



 Due to a scarcity of studies or conflicting results, the effect of Neural Mobilization remains uncertain for various conditions, such as postoperative low back pain...

Basson, 2017



Neurodynamics



- Order of movement
 - Different movement sequences will cause neural structures to move differently relative to adjacent interfacing tissues
 - Neurodynamic examination can be modified to replicate the order of movement used by patients during symptomatic activities

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Sliders aka Nerve Flossing

- Movement of at least 2 joints (ex head and foot)
 - One movement elongates the nerve Other movement shortens
- Increased excursion with minimal tension
- Should not be provocative
- More tolerable than tensioning a nerve
- Where to begin with the subacute patient



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Mechanical Sliding Techniques

- Nerve glide: Elongate nerve at one joint balanced by reduction in length of nerve bed at an adjacent joint
 - Nerve slides relative to surrounding structures
 - Longitudinal excursion of the nerve
- Dynamic variation in intraneural pressure
 - Facilitate evacuation of intraneural ed€
 - Reduce symptoms



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Tensioners

- Movement of joints to elongate (stretch) nerve
- More stressful and higher risk of irritation
- For patients who demonstrate impairments in elongation
 - Irritable patients
 - Can take to point of mild stretching
 - Non-irritable
 - Can take to onset of mild symptoms

https://www.youtube.com/watch?v=Xy1Lv3FK2Dk

University of Colorado Anschutz Medical Campus a Tensioning technique

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Slump: A \rightarrow B Slider, C \rightarrow D Tensioner



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How to progress neuro-dynamics?

Irritable	Non-irritable		
Goal: Pain relief Treatment non-provoking initially Grades I and II Sliders Postures to decrease tension	Goal: Increase mobility/HEP Treatment non-provoking initially Grade II Slider progressing to Grade III and IV and Tensioners		
Treatment Progression			
Increase # of Repetitions Increase length of time (holds) Increase amplitude and grade as tolerated Increase tension in the nervous system Move application of force closer to the involved area Treat non-neural structures			
_			

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CPG: INTERVENTIONS – TRUNK COORDINATION, STRENGTHENING, AND ENDURANCE EXERCISES

- Trunk coordination, strengthening, and endurance exercises to reduce low back pain and disability in:
 - Subacute and chronic low back pain with movement coordination impairments
 - Post–lumbar microdiscectomy

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In CPG, exercise/movement coordination focus included in:



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Terminology of stabilization approaches

- Varies widely
- Local Approach
 - MCE=Motor Control Exercise
 - LSE=Local Stability Exercise
 - Specific
- Global Approach
 - General

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Exercise over other interventions

 Both strength/resistance and coordination/stabilization exercise programs are effective over other interventions in the treatment of people with chronic low back pain

Searle, 2015 Systematic Review/Meta-analysis



Motor control exercise-not superior



- MCE is probably more effective than a minimal intervention for reducing pain
- MCE probably does not have an important effect on disability, in patients with **chronic** LBP.
- There was no **clinically** important difference between MCE and other forms of exercises or manual therapy for acute and chronic LBP.

Cochrane Review, Saragiotto, 2016

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An update of stabilization exercises for low back pain: a systematic review with metaanalysis



- There is strong evidence stabilization exercises are **not more effective** than any other form of active exercise in the long term.
- The low levels of heterogeneity and large number of high methodological quality of available studies, at long term follow-up, strengthen our current findings, and further research is unlikely to considerably alter this conclusion. Smith, 2014

Pilates and LBP

- Some evidence for the effectiveness of Pilates for low back pain
- No conclusive evidence that it is superior to other forms of exercises.
- Decision to use Pilates may be based on the patient's or care provider's preferences, and costs.



Yamoto, 2015, Cochrane Review

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Extension strength may be important

- Secondary analysis of data from 6 studies show extension weakness related to poor outcomes (Steele, 2018)
- Extension weakness and lumbar extensor deconditioning is present independent of surgery and may be a factor involved in CLBP. (Conway, 2018)
- Improvements in lumbar extension strength may be related to positive and meaningful clinical outcomes.







Post-microdiscectomy stabilization supported

 2 RCT's showed better outcomes with lumbar stabilization and therapist educational sessions following microdiscectomy as compared with independent exercise, and another control group of no prescribed exercises



Yilmaz et al, 2003, Kulig et al, 2009

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Cochrane Review for Non-specific LBP

- Reviewed acute, sub-acute and chronic LBP for a total of 60 RCT's
- Exercise decreases pain in chronic LBP
- Graded activity improves absenteeism in sub-acute LBP
- Exercise is as effective as other conservative treatment or no treatment in the acute population.
- GENERALLY, EXERCISE IS GOOD!

Hayden, 2005



Generic "one size fits all"?



- No approach has been shown to be superior to others in the literature
- Generally, something (exercise) is better than nothing
- Lack of success potentially may be due to underdosing, heterogenous populations?
- Subgrouping: likely the way we will be most apt to maximize treatment effect for each patient



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Model of Spinal Subsystems



Complex system

• "Spinal function ... the ability to create, absorb, and transfer force and motion to the terminal appendicular segment during the performance of skilled motor tasks." Kibler, 2006

- Much more complicated than "core stability"
- Complex neuromusculoskeletal system Spencer 2016 University of Colorado Physical Therapy Program Anschutz Medical Campus Passive Role 1: Signals transducers of ctive Role 1: Process Role 1: forced and Neura information from motion sensor subsystems vertebral positions information • Role 2: Determine and motions · Role 2: actuator for how much stability is Role 2: Structural stiffness/stability, stability, limits motion at end range necessary and control motion motion, forces Muscle capacity/size Movement Ligamentous/ Fatigue **Coordination altered** Segmental · Quality/fatty infiltrate hypermobility Muscle · Local/global activation/response timing Proprioception Specific muscle group activation-Synergy or patterns of activation • Pain, Brain Changes Movement pattern changes do Physic Anschutz Medical Campus

Subgrouping

- Each patient is unique and could have:
 - Different impairments across subsystems
 - Different treatment effect modifiers (fear of movement, depression, age) that would alter the intervention focus.
- Underlying impairment is often unclear, so hard to target

Silfies Ortho Section Meeting 2016

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Subgrouping

- Even when "targeted":
 - Recovery of underlying impairments is not automatic
 - No guarantee that targeting will resolve symptoms or that isolated muscle changes will impact function

Hides, Allison, Jacobs, Lomond, Moreside, MacDonald, Butler, D'hooge Silfies Ortho Section Meeting 2016



Some guidance

 Use of a self-report instability questionnaire may help identify individuals who are more likely to respond to motor control (local) approach

Macedo et al 2014

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Lumbar spine instability Questionnaire			
Please identify if the following activities, positions, or descriptions are appropriate back condition. You may check as many of the indicators that you feel are approximately activities and the indicators and the second secon	riate in describing yo propriate.	ur current low	
Please mark "YES" if the following descriptions are appropriate in describing your current condition and "NO" if t description does not describe your current condition.			
	YES	NO	
I leef like my back is going to "give way" or "give out" on me			
I led the need to frequently pop my back to reduce the pain			
I have lequent times when my pain occurs throughout the day			
I have a past history where my back catches or locks when I twist or bend my spine			
I have pain when I sit to stand or stand to sit			
I have a lot of pain when I sit up from lying down if I don't rise up the right way			
My pain is sometimes increased with quick, unespected, or mild movements			
I have difficulty sitting without a back support such as a chair and leel better with a supportive back	vrest		
I cannot tolerate prolonged positions when I can't move			
It seems like my condition is getting worse over time			
I have had this problem a long time			
I sometimes get temporary relief with back brace or corset.			
I have many occasions when I get muscle sparm-			
I sometimes am fearful to move because of my pain			
I have had a back injury from trauma in the part Mac	Macedo 2014		

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A few concepts pulled out of questionnaire

- Back "gives way/gives out"
- Frequently "pop" back
- H/O trauma
- Pain:
 - Throughout day
 - For a long time/worse over time
 - Transitions
 - · Likely with quick movements

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Some Guidance: Preliminary Clinical Prediction Rule

(was not validated in Rabin validation study)

- Stabilization classification Those with ACUTE LBP and the following characteristics are likely to do well with stabilization
 - Age less than 40 years
 - Positive prone instability test (PIT test)
 - Presence of aberrant movements with active motion testing
 - SLR greater than 91 degrees

Hicks, 2005



Without CPR validation, what can we gather from this information? What does this person look like? (Beyond CPG)

- Trends younger (?before collagen changes)
- · Likely recurrent. Acute on chronic?
- Aberrant movements
- Intervention: local progressing to global
- Hicks protocol did not progress into function beyond walking

Hicks, 2005

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A Clinical Prediction Rule to identify Patients With LBP Who are likely to experience short-term success following lumbar stabilization exercises: A Randomized Controlled Validation Study

- 105 patients with LBP stratified by CPR status and then randomized to receive
 - Stabilization program or
 - Manual therapy (MT) and ROM/flexibility exercises.
- 11 treatment sessions delivered over 8 weeks.
- Approach: local to global to functional (added beyond Hicks derivation study)
- Rule did not validate due to lack of power (sample size), but found that aberrant motions and + PIT test predicted success ~80% of the time

Rabin, 2014



A Clinical Prediction Rule to identify Patients With LBP Who are likely to experience short-term success following lumbar stabilization exercises: A Randomized Controlled Validation

Study

IMPLICATIONS:

- Patients with LBP presenting with aberrant lumbar movement and a + prone instability test may benefit most from a stabilization program including local-global-functional approach
- Based on 2° analysis-needs to be formally studied



Rabin, 2014

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Model of Spinal Subsystems



Exploring local vs. global









Local: Inner unit

- Tonic
 - Type I fibers
 - Endurance
 - fatigue resistant
 - Local
 - Tend to UNDERfire





Inner Unit

• Inner unit muscles (endurance):

- Are deep, sometimes very deep
- Control
 - neutral joint position of lumbar vertebrae
 - motion between individual segments
- · Have continuous, low level, tonic contraction
- Activation is *independent* of force direction of external loads
- Anticipatory activation (feedforward)
- Enhances muscle stiffness before initiation of outer unit muscles.
- More examples: transversus abdominis, multifidus, diaphram, pelvic floor

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All-inclusive, "corset"



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Global: Outer unit

- Phasic (outer unit)
 - Type II fibers
 - Strength
 - Tend to OVERfire



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Global: Outer Unit

- Outer unit muscles (strength):
 - Generally more superficial (and easy to palpate)
 - Produce more torque than inner unit
 - · Are controlled independently of inner unit
 - Activation is **dependent** upon direction of force of external loads
 - Create Phasic contractions that are proportional to demand
- More examples: Rectus abdominis, external oblique, internal oblique, quadratus lumborum.



What happens with pain?

- With pain, the relationship between task demand for stability and recruitment of appropriate muscles becomes disrupted, resulting in delayed trunk-muscle reflex responses and excessive outer unit activation
- We don't quite know how/if this matters or how to intervene.

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Components/Progression

- Based on individual impairments and functional limitations
- Static ("neutral" spinal posture with no segmental displacement) or
- Dynamic (dynamic segmental movement) also called Mobility (freedom of movement at spinal segments)



Think initial activation

- To help them "get the idea: (either bracing or ADIM)
- No evidence to guide us on whether we should use ADIM or bracing.



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Think initial activation-which one?

- Clinical experience: if they "over-brace" for everything already, might need to learn ADIM.
- If they are very low-tone, have a positive PIT test, maybe bracing is the way to go.
- But very quickly move on...



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Think Dissociation-stop/prevent motion



What's wrong with these pictures?





Think stability in neutral adding load



Think anti-rotation





Functional anti-rotation





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Mobility: Think articulation or segmental spinal movement – less postural support moving from NWB to WBing




Mobility adding load

- Progressive stability and gravitational demands
- Single-plane to multiplane
- Adding load from top or • bottom
- Encourage uniformity of curve (avoid hinge point)



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Movement Quality



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Movement quality, not just activation, endurance or strength

- Correction of movement patterns and progression to function may be shortchanged in PT treatment
- Challenging, but necessary to change habitual posture and movement patterns (Adkins, Remple, Snodgrass, Lang)
- Extremely hard to research

Silfies Ortho Section Meeting 2016



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Observational Movement Analysis

- What tasks are important to them?
 - Lifting
 - Cooking
 - Reaching
 - Running, cutting
- Tailor your education and intervention to their goals



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Change to Quality of Movement requires:



- Lots of practice of function/task
- Feedback, with emphasis on intrinsic
- Practice in new environments with variation
- Part, quickly progressing to full task practice



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Motor control principles require progression into function





Cognitive Stage:

- ADIM or bracing
- Diagrammatic breathing
- Awareness of neutral position of spine
- Dissociation training especially hip/lumbar including activation of gluteals
 - "Gluteal Amnesia"
- Progressively adding load in neutral positions

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Associative stage

- Consistency of performance, success, and refinement
- Progressively integrating spinal movement
- Progressing to functional positions with less postural support
- Progressive light to more challenging dynamic tasks
- Carefully watching movement patterns with extrinsic feedback progressing to more intrinsic





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Move to autonomous stage

- Tasks become more habitual and automatic
- More dynamic activities: consider rhythmic stabilization, unstable surfaces, add speed, reaction
- Encourage patient to nominate activities to work on (customized to goals)

Alrwaily, 2017 Appendix





Take Home Message:

- No matter which approach we use, we are getting a small to moderate effect on outcomes
- At present, there is no clear classification or treatment approach winner
- The bigger issue: Are we changing motor control and movement impairments using these approaches?
 - Jacobs 2015, Lomond 2014, Moreside 2014, MacDonald 2009)
 - Silfies 2016 Ortho Section Conference



Take Home Message:

- Assess all systems and try to tailor approach
- Don't forget to carefully assess movement impairment
- Get them off the ground!
- Train function

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Acknowledgements

- Sheri Silfies-2016 Orthopedic Section Meeting
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 - Great summary of approaches by Hodges, McGill, O'Sullivan, Sahrmann in Alrwaly, 2017 and suggestion of combined approach with some similarities to those presented here.
- · Fellow CU folks-David James, Lauren Hinrichs







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INTERVENTIONS – PROGRESSIVE ENDURANCE EXERCISE AND FITNESS ACTIVITIES





Fitness focus

- Chronic low back pain <u>without</u> generalized complaints
 - moderate or high-intensity exercise



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Fitness: Chronic low back pain with generalized pain

- Central Sensitization: Increased neural sensitivity to afferent stimuli, including proprioception and movement, common in this population
- Impacts functional status and pain perception by:
 - Deficits in aerobic fitness and tissue deconditioning
 - Potentially together with underlying psychosocial factors



Fitness: Chronic low back pain with generalized pain

- Caution: May be physiological reasons for †d symptoms/ poor response to high exercise intensity:
 - Increases in immune activation with release of proinflammatory cytokines
 - Blunted increases in muscular vascularity leading to widespread muscular ischemia
 - Inefficiencies in the endogenous opioid and adrenergic pain-inhibitory mechanism.

Staud, 2015, Grace, 2014

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Fitness: Chronic low back pain with generalized pain

- Aerobic fitness is an important component of reducing pain and improving/ maintaining function of these patients.
- Should incorporate progressive, low-intensity, submaximal fitness and endurance activities into pain management and health promotion strategies



Submaximal exercise testing

- Basic measures of exercise responses include HR, BP, respiratory rate (RR), rating of perceived exertion (RPE), and breathlessness.
- Details beyond the scope of course



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INTERVENTIONS – PATIENT EDUCATION AND COUNSELING





Behavioral education, also known as cognitive behavioral theory:

Encompasses many aspects of patient education and counseling for patients with LBP

- Activity pacing
- Attention diversion
- Cognitive
 restructuring
- Goal setting
- Graded exposure

University of Colorado Anschutz Medical Campus Motivational enhancement therapy

- Maintenance strategies
- Problem-solving strategies

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Newer Paradigms of Pain



- Brain interprets multiple inputs
- If brain interprets threat, pain is produced
- Ongoing pain leads to <u>central</u> <u>sensitization</u> such that normal touch is reported as painful
- Good news
 - plasticity of nervous system
 - desensitization can occur through graded exposure to the provoking symptom

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Pain Neuroscience Education (PNE) formerly known as TNE

- Explaining pain from a biological and physiological perspective (how brain and nervous system processes pain) allows patients to exercise, move, think different about pain
- Re-conceptualizing pain as the nervous system's process of determining threat of the injury
- Pain is not always an accurate measure of the degree of injury to tissues (Louw, Diener, Butler and Puentedura, 2011)

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PNE

- Emphasizes anatomy of nervous system and its function
- Deemphasizes tissue injury
- Nervous system can increase or decrease sensitivity to help them cope with persistent pain
- One on one education format is most common



How you educate your patient is everything



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Evidence

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The results of this updated systematic review of PNE for MSK pain provides strong evidence for PNE improving pain ratings, pain knowledge, disability, pain catastrophization, fear-avoidance, attitudes and behaviors regarding pain, physical movement and healthcare utilization



in adults. The Cochrane database of systematic reviews. 2011(3):CD007938. Lynch ME, Watson CP. The pharmacotherapy of chronic pain: a review. Pain research & management. Spring 2006;11(1):11-38.



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PNE: Methods Of Delivery

Professionals

Physical therapists

Duration and frequency

- 10-15 minutes
- 1-2/week
- Stand-alone and combined with other "physical" treatments

Educational format

- One-on-one verbal communication
- Two studies utilized group sessions.

Louw A, Zimney K, Puentedura EJ, Diener I. The efficacy of pain neuroscience education on musculoskeletal pain: A systematic review of the literature. *Physiotherapy Theory and Practice*. Jul 2016;32(5):332-355 Louw A, Diener I, Butler DS, Puentedura EJ. The effect of neuroscience education on pain, disability, anxiety, and stress in chronic musculoskeletal pain. Archives of physical medicine and rehabilitation. Dec 2011;92(12):2041-2056.

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PNE: Content

- Neurophysiology of pain
- · Nociception and nociceptive pathways
- Neurones
- Synapses
- · Action potential
- Spinal inhibition and facilitation
- Peripheral sensitization
- · Central sensitization
- · Plasticity of the nervous system

Educational tools

- Prepared pictures
- Metaphors
- Hand drawings



Low A, Butter DS, Diener I, Puentedura EJ. Development of a preoperative neuroscience educational program for patients with lumbar radiculopathy. American journal of physical medicine & rehabilitation / Association of Academic Physiatrists. May 2013;92(5):446-452. Moseley L. Combined physiotherapy and education is efficacious for chronic low back pain. Aust J Physiother. 2002;48(4):297-302.



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PNE⁺

- Mobilization and manipulation
- Soft tissue massage
- Muscle and neural mobilization
- Trunk stabilization
- Circuit based aerobic exercise
- · Movement exercises
- Pacing of ADLs
- Graded exposure with
 ADLs
- Trigger point dry needling
- Neck stabilization exercises
- Aquatic exercise program

University of Colorado Anschutz Medical Campus Beltran-Alacreu, H., I. López-de-Uralde-Villanueva, et al. (2015). "Manual Therapy, Therapeutic Patient Education, and Therapeutic Exercise, an Effective Multimodal Treatment of Nonspecific Chronic Neck Pain: A Randomized Controlled Trial." American journal of physical medicine & rehabilitation/Association of Academic Physiatrists.

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education versus aquatic exercise alone for patients with chronic low back pain: a randomized controlled trial." Clinical rehabilitation 29(6): 538-547. Ryan, C. G., H. G. Gray, et al. (2010). "Pain biology education and exercise classes compared to pain biology education alone for individuals with chronic low back pain: a pilot randomised controlled trial." Manual therapy 15(4): 382-387. Téllez-Garcia, M. A. I. de-la-Llave-Rincón, et al. (2014). "Neuroscience education in

addition to trigger point dry needling for the management of patients with mechanical chronic low back pain: A preliminary clinical trial." J Bodyw Mov Ther 19(3): 464. 472. Vibe Fersum, K., P. O'Sullivan, et al. (2013). "Efficacy of classification-based

Vibe Fersum, K., P. O'Sullivan, et al. (2013). "Efficacy of classification-based cognitive functional therapy in patients with non-specific chronic low back pain: A randomized controlled trial." European Journal of Pain 17(6): 916-928.

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The efficacy of pain neuroscience education on musculoskeletal pain: A systematic review of the literature



Louw A, Zimney K, Puentedura EJ, Diener I. The efficacy of pain neuroscience education on musculoskeletal pain: A systematic review of the literature. *Physiotherapy Theory and Practice*. Jul



Good education:

- Encourage early resumption of normal or vocational activities even when still experiencing pain
- Describe the overall favorable prognosis of low back pain
- Encourage positive and active coping strategies
- -Facilitate increasing activity levels

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Good education:

- Explain how positive imaging findings are found commonly in asymptomatic people
- -Defuse language like "degenerative spine disease"
- -Descriptions of the strength of the spine and associated structures

Bad Education



Cognitive behavioral concepts

 Cognitive Behavioral Therapy – A psychotherapeutic approach, a talking therapy, that aims to solve problems concerning dysfunctional emotions, behaviors and cognitions through a goaloriented, systematic procedure. (ICSI.org)



TREATMENT PROGRESSION



Think/Pair/Share

- 1. What intervention would be most appropriate for a patient with chronic pain who has LE symptoms after sustained postures, and has a positive SLR?
- 2. In chronic low back pain, which of the following should be included in the physical therapist's approach?
 - a. Focus on patient self-management
 - b. An episodic approach
 - c. Emphasis on patient preference
 - d. Development of long term therapeutic alliance
 - e. Focus on addressing and correcting impairments
 - f. Impairment-based HEP
 - g. Aerobic exercise





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Categorizing Special Populations into the Low Back Pain Clinical Practice Guidelines







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Post-operative/Surgical Patients







Types of Surgical Intervention

- Discectomy/microdiscectomy
- Laminectomy/microlaminectomy
- Laminotomy
- Fusion (with or without instrumentation)
- Disc replacement



Lumbar Discectomy

- Minimally-invasive procection
 - · Percutaneous discector
 - Endoscopic discectomy
 - Microdiscectomy
- · Removal of disc material
- Indication herniated dis

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Discectomy

Success rate reported 60-80%



Korres DS, Loupassis G, Stamos K. Results of lumbar discectomy: a study using 15 different evaluation methods. *European Spine Journal* 1992;1:20–4

Findlay GF, Hall BI, Musa BS, Oliveria MD, Fear SC. A 10-year follow-up of the outcome of lumbar microdiscectomy. *Spine* 1998; 23:1168–71

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Yorimitsu E, Chiba K, Toyama Y, et al.Long term outcomes of standard discectomy for Lumbar Disc Herniation. *Spine* 2001;26:652–8.



Lumbar Discectomy

- Quicker recovery
- Return to office work, driving 1-2 weeks
- Avoid flexion, particularly loaded flexion during first 6 weeks, avoid increased sitting
- Spine stabilization
- Hamstring stretching/neuro dynamics (early)
- General conditioning
- · Body Mechanics-transfer, bed mobility, lift, bend

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MMG

Lumbar Laminectomy-Decompression

Procedure

- Removal of lamina, ligamentum flavum
- Indications:
 - Disc herniation
 - Spinal stenosis
- Muscle tissue is dissected from the laminae and retracted
- Appropriate spinous processes and laminae are identified



The entire lamina is removed from the affected vertebra.

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Lumbar Laminectomy

- Procedure
 - Spinous process is removed
 - Lamina and ligamentum flavum are removed
 - Nuclear material may be removed
 - Foraminotomy may be performed
 - Success rate reported approx. 80%
 River V, Koret MC, Gitkan JA, Rohd V, Lorger realized approx.
 River V, Koret MC, Gitkan JA, Rohd V, Lorger realized approx.

Careford and Parage 14 April 2014 Rec. Estimation and Rec. Estimationa and Rec. Estima

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Lumbar Laminectomy

- Rehabilitation
 - · Usually no brace, bed mobility, posture
 - · Cautious with lumbar flexion
 - · Stabilization training
 - · Residual leg symptoms
 - Pain management
 - Often no BLT (bending lifting twisting) for 3-4 week period



Lumbar Laminectomy

- Rehabilitation continued
 - Soft tissue mobilization/scar mobilization
 - Progressive return of cardinal plane motion
 - Rotation
 - Flexion
 - · Side-bending
 - Progressive stabilization, trunk and abdominal strengthening
 - TVA, abdominals, multifidus?, etc...
 - Table/mat -> standing-> combined motion -> functional/occupational activities

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Lumbar Fusion

- Various procedures to achieve arthrodesis
- Indications:
 - DDD?
 - Severe pain
 - · Post-traumatic instability
 - Degenerative spondylolisthesis
- Procedure
- Instrumented Fusion
 - Stabilization with pedicle screws
 - Bone graft material between posterior elements







Spinal fusion for chronic low back pain: systematic review on the accuracy of tests for patient selection aul C. Willems, MD, PhD^{a,*}, J. Bart Staal, PT, PhD^b, Geert H.I.M. Walenkamp, MD, Phi Rob A. de Bie, PT, PhD^c

The Spine Journal 13 (2013) 99-109

"No subset of patients with chronic LBP could be identified for whom spinal fusion is a predictable and effective treatment"



Spinal Fusion vs. Rehabilitation

RCT surgical stabilization of the lumbar spine vs. an intensive rehabilitation program for patients with chronic low back pain

- Design: Multi-center randomized controlled trial.
- **Participants:** 349 participants aged 18-55 with chronic low back pain of at least one year's duration who were considered candidates for spinal fusion.
- Intervention: Lumbar spine fusion or an intensive rehabilitation
- **Outcome:** ODI and the shuttle walking test measured at baseline and two years post. SF-36 instrument.
- **Results:** The mean ODI : 46.5 (SD 14.6) to 34.0 (SD 21.1) in SG and from 44.8 (SD14.8) to 36.1 (SD 20.6) in RG.
- No significant differences between the treatment groups with any of the other outcome measures. Both groups reported reduction in disability at 2 year follow up.
- BMJ 2005;330:1233 (28 May)

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Spinal Fusion vs. Rehabilitation

Conclusions: Both groups reported reductions in disability during two years of follow-up, possibly unrelated to the interventions. The statistical difference between treatment groups in one of the two primary outcome measures was marginal and only just reached the predefined minimal clinical difference, and the potential risk and additional cost of surgery also need to be considered. No clear evidence emerged that primary spinal fusion surgery was any more beneficial than intensive rehabilitation

BMJ 2005;330:1233 (28 May), doi:10.1136/bmj.38441.620417.8F (published 23 May 2005)



Cage Fusions

- 63.9% overall disability rate at 2 years after fusion
- 22.1% reoperation rate
- Other complications 11.8%

Fenton JJ, Mirza SK, Lahad A, Stern BD, Deyo RA. Variation in reported safety of lumbar interbody fusion: influence of industrial sponsorship and other study characteristics. *Spine*. Feb 15 2007;32(4):471-480.

Deyo RA, Gray DT, Kreuter W, Mirza S, Martin BI. United States trends in lumbar fusion surgery for degenerative conditions. *Spine*. Jun 15 2005;30(12):1441-1445; discussion 1446-1447.



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Once surgery has been performed, what is the role of the physical therapist?

- Using the results of a systematic review to evaluate the effectiveness of active treatments used in the rehabilitation after first-time lumbar disc surgery we find:
 - Ambiguity-Not enough studies conducted, particularly in the acute post-op stage, but no known benefit thus far
 - A strict exercise or SLR program immediately after surgery does not change long term outcome or recurrence rates
 - A "vigorous" exercise program at 4-6 weeks post-op does allow for a faster return to work and activities, but no long term (1 year) difference between groups has been found



Rehabilitation After Lumbar Disc Surgery: An Update Cochrane Review

Ostelo, Raymond W. J. G., PhD¹¹; Pena Costa, Leonardo Oliveira, PhD²⁵; Maher, Christopher G., PhD¹⁵; de Vet, Henrica C. W., PhD⁵; van Tulder, Maurits W., PhD¹

Spine: August 1, 2009 - Volume 34 - Issue 17 - p 1839-1848 doi: 10.1097/BRS.05013e3181abbfdf Cochrane Collaboration

Conclusion. Exercise programs starting 4 to 6 weeks postsurgery seem to lead to a faster decrease in pain and disability than no treatment. High intensity exercise programs seem to lead to a faster decrease in pain and disability than low intensity programs. There were no significant differences between supervised and home exercises for pain relief, disability, or global perceived effect. There is no evidence that active programs increase the reoperation rate after first-time lumbar surgery.

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Your plan of attack...

What disabilities will th surgery?	erapists deal with after	What disabilities will surgery?	therapists deal with after
 Pain Original pre-op pain Back pain Soce pain Radiculopathy Spreading pain Nerve sensitipation Pain from altered mochanics/stress on adjacent structures/joints 	Disability/function ADCs Loading Posture Ergonomics	Range of Motion Scartissue Global Inter-segmental Adjacent joints – i.e., SU, Hip, T-spine	 Psychological issues – health Fear Anxiety Catastrophization Depression
	What disabilities will th surgery?	What disabilities will therapists deal with after surgery?	
	Muscle control Sinergth Endurance Motor Control Tain Inhibition Signment (Sprei Statilization Centionveculer	 General Health issues Other 	
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Developing a program



Education - Preoperatively

- Preoperative education directed towards decreasing fear and anxiety associated with the impending surgery (Asilioglu and Celik 2004; McDonald et al. 2004; Lin and Wang 2005; Carr et al. 2006).
- Patients want preoperative education as a means to "...decrease fear and anxiety" (Louw 2007)
- Fear of pain and anxiety associated with pain has been linked to increased levels of disability (Kendall, N., et al. 1997; Waddell 1998).
- Pre-op lumbar surgery: 50% of patients expressed fear and anxiety about their persistent pain and were afraid that the they were experiencing postoperatively would get with time Louw (2007)



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Education

- Immediate postoperatively
 - · Acute care therapist
- During rehabilitation
 - Qualitative data:
 - 1. What is wrong with me?
 - 2. How long will it take?
 - 3. What can I (the patient) do for it?
 - 4. What can you (the PT) do for it?

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EXERCISE...

- Exercise is an effective means of treating patients with persistent disability following lumbar surgery.^{18, 37}
- In chronic LBP populations (non-surgical) there is also good evidence for the use of exercise in helping patients with pain and disability. ^{38, 39}
- The exact content of the exercise program may consist of:
 - Spinal stabilization exercises
 - Cardiovascular exercises
 - General conditioning
 - Stretches of the lumbar spine, adjacent thoracic spine and hip joints.



The relevant importance



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BANGE OF MOTION...

- Very **little is known** about the effect of treatments aimed at maintaining or increasing ROM of the adjacent joints to the surgical levels.
- Given the fact that numerous biomechanical studies have implicated the high incidence of adjacent joint problems (transitional syndrome) following surgery^{20, 22, 45}, it would serve clinicians well to consider treatments aimed at increasing (borrowing) or at least maintaining ROM of the joints above and below the surgery site.
 - Exercises
 - Manual therapy



Aerobic exercise for pain...

 There are thresholds for both the intensity (>50% Vo(2)max) and duration (>10 min) of exercise required to elicit exercise analgesia.



(Hoffman, Shepanski et al. 2004)

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POSTOPERATIVE REHABILITATION

- <u>Timing, dosage and frequency</u>:
 - There is little evidence available for the immediate start of a postoperative program following surgery.
 - Rehabilitation started 4-6 weeks after surgery is effective in improving short-term disabilities.^{18, 37, 59}
 - Such a program may run 2-3x/week for up to 8 weeks.^{37, 59}
 - Patients should also be instructed in a home exercise program, allowing them to become self-sufficient and able to manage their own well-being as they progress through formal rehabilitation towards discharge.⁶⁰



So where are we at right now?

- Spinal surgery is prevalent and increasing
- At least 1 in 4 people will have persistent pain and disability following lumbar surgery
- Postoperative rehabilitation has not shown significant ability to decrease postoperative pain and disability
- Surgeons do not readily send patients to rehabilitation following lumbar surgery



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Adding to the problem...

• High levels of fear and anxiety associated with surgery. ^{2,13,44,52}



- Patients want preoperative education as a means to "...decrease fear and anxiety"
- Pre-op lumbar surgery: 50% of patients expressed fear and anxiety about their persistent pain and were afraid that the pain they were experiencing postoperatively would get worse with time.
Preoperative education for surgery

- Hip replacement,^{11,19,38,52,54}
- Knee replacement,^{4,19,38,49,52}
- Cardiac surgery,^{1,22,78,79,85}
 - Abdominal 5,69,86-88 urgery.^{56,65,67}
- Increase knowledge of the surgical procedure,^{14,34,35,38}
- Reduce anxiety,^{5,7,15,18,22}
- Reduce postoperative pain,^{15,28,31,42,75}
- Decrease length of hospital stay^{38,54,70,75}
- Facilitate faster return to preoperative functional levels 1,28,31,54,77

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So what?

- Everyone believes preoperative education is important for spinal surgery
 - Patients
 - Surgeons
 - Physiotherapists
- Current models focus on anatomy/biomechanics or a psychology model
- Patients want more information regarding pain
- Anxiety/fear needs to be addressed



BMC Musculoskeletal Disorders

Home About Articles Submission Guidelines

Abstract. Background Methods/decon Discussion Authors' information Declarations Pafarances

Study protocol Open Access Open Paer Review

A comparative effectiveness trial of postoperative management for lumbar spine surgery: changing behavior through physical therapy (CBPT) study protocol

Kristin R Archer III, Rogelio A Coronado, Christine M Haug, Susan W Vanston, Clinton J Devin, Christopher J Fonnesbeck, Oran S Aaronson, Jaseph 5 Cheng, Richard L Skolasky, Lee H Riley III and Stephen T Wegener

BMC Musculoskeletal Disorders 2014 15:325

https://bmcmusculoskeletdisord.biomedcentral.c

Om/articles/10.1186/1471-2474-15-325 University of Colorado Anschutz Medical Campus Physica

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Annals of Internal Medicine

ORIGINAL RESEARCH

Surgery Versus Nonsurgical Treatment of Lumbar Spinal Stenosis A Randomized Trial

Anthony Delitto, PT, PhD; Sara R. Piva, PT, PhD; Charity G. Moore, PhD, MSPH; Julie M. Fritz, PT, PhD; Stephen R. Wisniewski, PhD; Deborah A. Josbeno, PT, PhD; Mark Fye, MD; and William C. Welch, MD

- Surgical candidates > 50 yo with lumbar spinal stenosis (n=169)
- Randomized to surgical decompression or PT
- Mean improvement in function (SF-36) was 22.4% Sx and 19.2% PT
- Intention to treat revealed no difference between groups
- No control
- Surgical decompression yielded similar effects to PT among patients with LSS considered to be surgical candidates

Ann Intern Med. 2015;162:465-473. doi:10.7326/M14-1420 www.annals.org





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Geriatrics Review)

(Systematic

Prevalence of back pain decreases with increasing age

- However, back pain is amount the 4 most commonly reported symptoms in the elderly
- Osteoarthritis, disc degeneration, osteoporosis and spinal stenosis increase with age
- Older people report less benign or mild back pain but higher prevalence of episodes which are severe or disabling
- The frequency Difuse verifeAbeaute Abeaute Abeaut









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Pediatric Chronic Pain: Biopsychosocial Assessment and Formulation

Christina Liossi, DPsych,^{4,5} Richard F. Howard, MBChB⁵

- Chronic pain in children is a recognized problem with alarmingly high prevalence rates
- The subjective experience results from:
 - Nociception
 - Affective
 - · Sociocultural
 - Behavioral
 - Cognitive
- · Not to be viewed as purely physical or psychological
- When assessing children with chronic pain information on a wide range of dimensions (biological, psychological and sociocultural) must be gathered
- · Management is multimodal

PEDIATRICS Volume 1 38, number 5, November 2016: e2 0160331

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Epidemiology of Chronic Pain in Children and Adolescents: A systematic review King et al

- Chronic pain and recurrent pain not associated with a disease is very common in childhood and adolescence
- Higher in girls and with increased age for most pain types
- Lower socioeconomic status associated with higher pain prevalence of headaches
- Prevalence rates
 - Headache 8-83%
 - Abdominal pain 4-53%
 - Back pain 14-24%
 - MSK pain 4-40%
 - Multiple pains 4-49%
 - Other 5-88%



PAIN: December 2011 - Volume 152 - Issue 12 - p 2729–2738



Approach to low back pain-the goal is to prevent Recurrence and Chronicity

Recurrence

- Prior episode
- Excessive spinal mobility
- Excessive mobility in other joints

Chronicity

- Symptoms below knee
- Depression/psychosoci al
- Fear of movement
- High pain intensity
- · Passive coping style

(Pincus et al, 2002; Jones, Macfarlane, 2005)

(Mogren, Pohjanen, 2005)

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With permission Tim Flynn and Terry Gebhardt

Traditional Biomedical Education Model



Greene DL, et al.. Lumbar disc herniation: evaluation of information on the internet. Spine (Phila Pa 1976). Apr 1



Biomedical Education



Thoraco-Lumbar Junction Mobilization or Manipulation (Age Dependent)



High-velocity, end-range, right-rotational force to the lower thoracic spine on the upper lumbar spine in a seated position on the table corner

- With the patient seated arms crossed on the plinth corner, rest the patient's arms on a pillow over your right shoulder
- Reach underneath the patient's opposite axilla and grasp the lateral scapula
- Use your right pisiform to contact the left transverse process of T12
- Induce right spinal rotation with your left arm and body
- Engage the restrictive barrier
- Apply a low velocity, high amplitude thrust into left rotation
- Follow with muscle energy

Past, Present and Future LumboPelvic Region



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Some sobering thoughts

- Too often, the choice of treatment reflects the skill of the professional rather than the needs of the patient.
- ...the treatment you receive will depend more on who you go see than what is wrong with your back.



Challenges we face...



System challenges

- Perhaps what we do is driven by number of codes over content of intervention?
- We are often forced into episodic treatments, even if that's not what the patient needs.





Past approaches with little validity



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Modalities: Ultrasound/Estim

- US: No evidence for benefit (improving pain or quality of life) in patients with chronic low back pain
 - (Ebadi et al 2014 Systematic Review; Seco et al 2011 Systematic Review)
- Electrical Stimulation
 - Chronic: Some evidence for transient modification of pain and improved function
 - Hi Frequency more effective
 - Acute: no evidence of benefit



Choosing Wisely campaign

 Don't use passive physical agents except when necessary to facilitate participation in an active treatment program.



Physical therapy Five treatments you probably don't need

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Challenges we face...



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Muscle Energy Approach/Osteopathic approach

- Can we really feel that? Rotated transverse proess, ERSR, FRSR, ERSL, Triplanar movement of sacrum
- Mystifying language could be harmful: Bone is out of place (BOOP)
- Landmark Palpation Accuracy ("Validity") and Reliability (accuracy "limited")
 - 33% agreement (interrater reliability) of palpation of PSIS "position"; 50% compared to yourself!
 - Correct Identification of Lumbar Level
 69% of the time
 - Mean Error Compared to US
 - L4 15 mm
 - L5 21 mm
 - PSIS 20 mm

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Kilby 2012, Cooperstein 2010, Snider 2011

SIJ Anatomy Reminder



- Like other synovial joints, the sacroiliac joint is reinforced by HUGE STRONG ligaments
- The ligaments of the sacroiliac joint are some of the strongest and toughest ligaments of the body (difficult to tear, stretch or manipulate)
- 1-4 mm of motion within the joint



Landmark Palpation Accuracy ("Validity") and Reliability

Back to MET approach:

- In advocating static palpation as a central element, no consideration is given to known asymmetrical muscle development and anatomical variation (especially side to side)
- An asymmetrical static pelvic finding should be considered an incidental finding unless supported by:
 - positive motion testing , springing or pain provocation tests.

change. 2000;3(2):54-59.

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Referral patterns to the SIJ



Kellgren, Feinstein



Fryer G. Muscle energy concepts - a need for

Journal of Osteopathic Medicine.

Normal vs. cLBP L4-5, L5-S1 Mooney, Robertson 1976



Lumbar Spine: Fryette's Laws don't hold up

- In studies on cadavers and living subjects, coupled motion in the lumbar spine is:
 - variable within an individual (from segment to segment)
 - highly variable between individuals.



Gibbons P, Tehan P. 1998;3(2):95-101



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Don't become paralyzed by a complicated algorithm!

More Importantly: 1. THINK 2. BE VERY CAREFUL with the <u>words</u> you





Summary

PRESENT

- Careful with:
 - Use of most modalities in treatment of LBP (except as a method to get them more active)
 - Trusting too much in palpation
 - Blindly following an approach that has questionable validity and reliability
 - Techniques may still be OK to use...but cautiously

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Questions?





Summary

Guidelines can improve care largely because the collective knowledge better informs an individual provider than solely relying on an his/her personal experience and trial and error with his/her case load



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Systematic Review of LBP guidelines

- According to high quality guidelines:
 - (1) all patients with acute or chronic LBP should receive education, reassurance and instruction on self-management options;
 - (2) patients with acute LBP should be encouraged to return to activity and may benefit from paracetamol (Tylenol), nonsteroidal anti-inflammatory drugs (NSAIDs), or spinal manipulation;
 - (3) the management of chronic LBP may include exercise, paracetamol or NSAIDs, manual therapy, acupuncture, and multimodal rehabilitation (combined physical and psychological treatment);
 - (4) patients with lumbar disc herniation with radiculopathy may benefit from spinal manipulation. To be determined...



Summary

Clinical practice guidelines for LBP primarily recommend an active approach to physical therapy care with the focus on exercise interventions and other strategies to help patients maintain and improve their overall activity levels

Chou R, Huffman LH. Nonpharmacologic therapies for acute and chronic low back pain: a review of the evidence for an American Pain Society/American College of Physicians clinical practice guideline.

Ann Intern Med. 2007



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Costly Problem

"Wait and see" approach → high rates of initial use of imaging, nonsteroidal antiinflammatory drugs, and opioid medications in the initial management of patients with LBP, in lieu of recommended advice, progressive return-to-activity and simple analgesics

Williams CM et al. Low back pain and best practice care: a survey of general practice physicians. *Arch Intern Med.* 2010



Costly Problem

Despite increasingly aggressive treatments, contrary to recommendations, no evidence that clinical outcomes are improving; in fact, rates of chronicity related to an episode of LBP are increasing

Freburger JK et al. The rising prevalence of chronic low back pain. Arch Intern Med. 2009

Martin BI, Deyo RA et al. Expenditures and health status among adults with back and neck problems. *JAMA*. 2008

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Costly Problem

Wide variation and suboptimal primary care management for patients with an acute episode of LBP → increasingly invasive and costly interventions

Deyo RA et al. Overtreating chronic back pain: time to back off? J Am Board Fam Med. 2009



Costly Problem

A majority of patients go on to experience persistent and/or recurrent symptoms, and that up to one-third report moderate to severe pain 1 year following the initial primary care encounter

Croft PR et al. Outcome of low back pain in general practice: a prospective study. *BMJ*. 1998

Dunn KM et al. Characterizing the course of low back pain: a latent class analysis. Am J Epidemiol. 2006

Von Korff M, Saunders K. The course of back pain in primary care. Spine. 1996



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Alternative: Early PT=lower costs

Early physical therapy consistently results in decreased cost and medical utilization without compromising outcomes.

Preliminary evidence suggests that early physical therapy may decrease cost without compromising outcomes.

Additional high-quality research is required. Ohja, 2016, Systematic Review



Alternative: Early PT = lower costs

Lower risk of subsequent use of lumbosacral injections, lumbar spine surgery, and frequent physician office visits among patients who received physical therapy soon after an episode of acute LBP compared to those who received physical therapy at later times

Gellhorn et al. Management patterns in acute low back pain: the role of physical therapy. *Spine. 2012*



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Alternative: Early PT = lower costs

Early physical therapy (within 14 days of primary care) associated with **decreased** use of advanced **imaging**, additional **physician visits**, lumbar **surgery**, lumbar **injections**, and **opioid** medications, as compared to delayed physical therapy.

Fritz JM, Childs JD, Flynn TW. Primary care referral of patients with low back pain to physical therapy: impact on future health care utilization and costs.. *Spine.* 2012



Alternative: Guidelines adherence=lower costs

Systematic Review: Preliminary evidence (4 studies) suggests that **adherence** to established clinical practice guidelines may assist with **decreasing healthcare utilization and costs**.

Additional prospective research needed

Hanney, 2015 Guideline Adherence Systematic

Review



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Alternative: CPG-based PT = lower costs

Adherence to LBP guideline-based recommendations associated with improved clinical outcomes and reductions in subsequent healthcare utilization and costs

Fritz JM, Cleland JA, Brennan GP. Does adherence to the guideline recommendation for active treatments improve the quality of care for patients with acute low back pain delivered by physical therapists? *Med Care*. 2007 Fritz JM et al. Physical therapy for acute low back pain: associations with subsequent healthcare costs. *Spine*. 2008



Alternative: CPG-based PT = lower costs

Adherent care = fewer visits and lower charges and with significantly greater improvement in disability and pain.

Fritz JM, Cleland JA, Brennan GP. Does adherence to the guideline recommendation for active treatments improve the quality of care for patients with acute low back pain delivered by physical therapists? *Med Care*. 2007



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Alternative: CPG-based PT = lower costs

And, during the year after discharge, receiving adherent care was associated with a lower likelihood of receiving prescription medication, magnetic resonance, or epidural injections

Fritz JM et al. Physical therapy for acute low back pain: associations with subsequent healthcare costs. *Spine.* 2008



Alternative: Early PT/Adherence = lower costs

Military Healthcare System 753,450 eligible patients with a primary care visit for LBP between 18–60 years of age 60% lower total LBP-related costs with early PT and guideline adherence

Childs, 2015

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But be sure to look at ALL the evidence

Difference in cost? No difference between early PT and Usual Care groups Improvement in disability? Other than at 4 weeks, no improvement in disability in PT vs. UC patients

Rhon, Miller, Fritz, 2018 Effectiveness and Downstream Healthcare Utilization for Patients That Received Early Physical Therapy Versus Usual Care for Low Back Pain: A Randomized Clinical Trial

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Second-Order Peer Reviews of Clinically Relevant Articles for the Physiatrist. Akuthota,

Marshall, Mintken, Schenkman, Kumbhare, Dinesh

- When the venerable New York Times has a headline entitled "Physical Therapy May Not Benefit Back Pain" ... the article ... merits further investigation
- Limitations of Fritz JAMA study:
 - Above average representation of highly educated, employed white patients with few comorbidities
 - 4 PT visits over 1 year
 - did not collect data on adherence to the home therapy protocol that was assigned to the early PT group.
 - Such patient adherence is associated with successful rehabilitation particularly at such prolonged followup after the intervention
 One veget follow up period also provided associated by appartunity for
 - One year follow-up period also provided considerable opportunity for cointervention, which the authors do not entirely account for and could have also contributed to the negative results



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In Summary

A growing body of evidence supports the appropriate content and timing of physical therapist care in managing low back disorders, which is reflected in the recommendations of the "Clinical Guidelines for Low Back Pain"

Delitto A et al. Low back pain: clinical practice guidelines linked to the international classification of functioning, disability, and health from the Orthopaedic Section of the American Physical Therapy Association. *J Orthop Sports Phys Ther.* 2012



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How to: Implementation effectiveness of improving therapist adherence to CPG-LBP

- A multi-faceted implementation strategy
 - QI approach Focus-PDCA (Plan-Do-Check-Act) cycle tool to address barriers and continuous quality improvement.
 - Physiotherapists were educated focusing on guideline recommendations and patient education, and received monthly reminders.
 - A competency test of knowledge and clinical decision-making.
 - Auditing to evaluate adherence to guideline recommendations based on 13 quality indicators.
- Effective in improving therapists' adherence to CPG-LBP and patient satisfaction with care.

Maroun, 2015



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How to: Implementation of a program to increase therapist adherence to TBC-LBP; a local story

- UC-Health Outpatient clinics
- Integrating TBC into Electronic Health Records/EPIC
- · Increase therapist accountability
- Begin to track outcomes based on classification

