Clinical Reasoning in Mechanical Diagnosis and Therapy (MDT) and OMPT: Classification, Intervention, and Impact on Musculoskeletal Health Care

Ron Schenk, Brian McClenahan
McKenzie Institute, USA Fellowship
Daemen College OMPT Fellowship

Learning Objectives:
At the completion of this presentation the learner will be able to:
- Analyze the similarities and differences between the Delitto, Maitland, Sahrmann, and McKenzie (MDT) classification systems.
- Understand the MDT clinical reasoning process.
- Analyze movement to determine centralization vs. non-centralization with consideration of patient response.
- Synthesize examination findings to categorize patients into directional preference, thrust and non-thrust manipulation and stabilization categories.
- Analyze the impact of MDT on health care costs and utilization.

Pathoanatomical Diagnosis
Expert Quotes
Back pain diagnosis
- “80% of back pain is caused by weak or tense muscles.”
- “The majority of LBP actually originates in the sacral ligaments.”
- “In 50% or more...the facet joint is the site of dysfunction.”
- “90-95% of back pain is due to disks.”
- “An extremely high percentage...have fascial problems.”
- “50%-70% of chronic symptoms are psychological in origin.”
Medical Model of Disease

- Signs/symptoms analyzed
- Pathology is determined
- Treatment corrects pathology
- Signs/symptoms disappear

Classification Systems for Low Back Pain

- Identifiable source of LBP present in <10%
- Classification systems often based on anatomical (theoretical) model
- No one classification system is more reliable than others (Riddle, 1998)
- Certain characteristics of particular classification systems may have appropriateness based on symptom chronicity (International Classification for Functioning 2013)

Diagnosis vs. Classification

Diagnosis: “The process of determining the cause of a patient’s illness or discomfort”

Classification: “The process of classifying clinical data into named categories of clinical entities for the purpose of making clinical decisions regarding therapeutic management”

(Rose, 1989)
Classification


Acute Low Back Problems in Adults

Bigos S et al. Agency for Health Care Policy and Research (AHCPR) 1994

- Manipulation can be helpful for patients with acute low back problems without radiculopathy when used within the first month of symptoms (Strength of Evidence = B).
- This was the first clinical practice guideline to recommend the use of manipulation in the care of acute LBP. Spinal manipulation is a safe, effective, and recommended intervention in the management of LBP.
- Spinal manipulation received the highest level of evidence of any intervention in the 1994 Agency for Health Care Policy and Research (AHCPR) Guidelines.
- Final recommendations included stay active approach, education, and general exercise.
- [www.ahcpr.gov](http://www.ahcpr.gov)
Comparison of a Guideline-Based Approach versus a Classification Approach in the Treatment of Acute, Work-Related Low Back Pain

Julie M. Fritz, PT, PhD, ATC
Anthony Delitto, PT, PhD
Richard E. Erhard, PT, DC

Department of Physical Therapy
University of Pittsburgh


Patient with acute LBP
Baseline Evaluation

AHCPR Group
All patients treated based on AHCPR Guidelines

Classification Group
Patients receive treatment specific to classification

Low Back Pain Classifications

Specific Exercise
Stabilization
Traction

INTERVENTION

Manipulation/Exercise
Activities to Promote Centralization
Stabilization exercises
Mechanical/auto-traction

A clinical prediction rule for classifying patients with low back pain who demonstrate short-term improvement with spinal manipulation.


Predicting Success with Manipulation

4 or more present:
Recent onset (<16 days)
Low FABQ (<19)
No symptoms below knee
Lumbar stiffness
Good hip IR (>35°)

Pre-test Probability of Dramatic Success with Manipulation

45%

Post-test Probability of Dramatic Success with Manipulation

+LR=24.3

95%

Passive Intervertebral Motion


Joint provocation testing

- Posterior-anterior central vertebral pressure (PACVP)
- Posterior-anterior unilateral vertebral pressure (PAUVP)
- Tranverse vertebral pressure (TVP)
- Maitland – Patient Response Method

Movement System Balance Theory


Sahrmann – Patient Response Method

When should we not test end range?

Clinical decision making
Mechanical Diagnosis and Therapy (MDT)

Examination for centralization and direction of preference

Why test end range?
- Confirm classification
- Reduce derangement
- Elicit centralization
- Expose dysfunction
- Expose relevant lateral compartment
- Determine prognosis

Repeated End Range Movements
- Flexion in standing
- Extension in standing
- Sidegliding in standing
- Flexion in lying
- Extension in lying
Repeated end range movements


Centralization

- Directional preference

Directional Preference

“Centralization is liberally defined as a movement, mobilization, or manipulation ‘technique’ targeted to pain radiating or referring from the spine, which when applied abolishes or reduces the pain distally to proximally in a controlled predictable pattern.”

“Centralization is defined in the classification system of occurring when a movement or position results in abolishment of pain or paraesthesia, or causes migration of symptoms from an area more distal or lateral in the buttocks and/or lower extremity to a location more proximal or closure to midline of the lumbar spine”

• MUST have Lower Extremity Pain
DEFINING CENTRALIZATION

• "Abolition Centralization: the most distal pain was abolished and pain was recorded more proximally on the second drawing than on the first."
• "Reductive Centralization: the pain was located at the same distal location but with reduced intensity."
• "Unstable Centralization: the pain was reduced or abolished during the repeated movement testing or positioning but after resuming a weight-bearing position for one minute, the pain intensity level returned to the pre-testing intensity”


Centralization is Frequently Misunderstood

McKenzie’s Method of Mechanical Diagnosis and Therapy (MDT) definition of centralization has evolved:

• 1981 Lumbar Spine Text
• “I would define this phenomenon as the situation in which pain arising from the spine and felt laterally from the midline or distally, is reduced and transferred to a more central or near midline position when certain movements are performed.”

McKenzie Institute Fellowship
• 2003 Lumbar Spine Text
  • “In response to therapeutic loading strategies, pain is progressively abolished in a distal to proximal direction with each progressive abolishing being retained over time until all symptoms are abolished. If back pain only is present, this moves from a widespread to a more central location and then is abolished.”

• 2008 MDT Research:
  • Centralization is characterized by spinal pain and referred symptoms that are progressively abolished in a distal to proximal direction in response to therapeutic loading strategies.
  • Very Objective Measures included to further remove clinician bias

Centralization:
Operational Definition
• Directed by precise application of movement & positioning
• Proximal change in pain location only
• Remains better – lasting effect during treatment
• Midline pain abolishes
• Overlay template
Centralization: Standardized Measurement

- Overlay Template
- Donelson et al. Spine 1991
- Werneke et al. Spine 1999
- Dolito et al. JOSPT 2012

Symptomatic Responses

- The changes in the patient symptoms that are elicited and recorded with the application of assessment procedures, treatment procedures or in response to functional activities and positions.
Mechanical Responses

- The measurable changes that occur in movement loss, dural tension, neurologic function, tolerance to functional activities and positions, or change in tested physical abilities.

Centralization

- Describes the phenomenon by which pain emanating from the spine is progressively abolished in a distal to proximal direction in response to therapeutic loading strategies, with each progressive abolition being retained over time. (Lasting Change)
- Symptomatic Response

Peripheralization

- Describes the phenomenon by which pain emanating from the spine spreads distally into or further into the limb as a result of loading strategies. (Lasting Change)
- Symptomatic Response
Directional Preference

- Phenomenon of preference for Postures/Movements that decrease, abolish or centralize symptoms and often decrease a limitation of movement. (Lasting Change).
- Symptomatic and/or Mechanical Response

Pain Response Subgroups

<table>
<thead>
<tr>
<th>PAIN RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-CEN</td>
</tr>
<tr>
<td>1. CEN/DP</td>
</tr>
<tr>
<td>2. CEN/Non-CEN</td>
</tr>
<tr>
<td>3. Non-DP/Non-CEN</td>
</tr>
</tbody>
</table>

CASE STUDY
Impact

• Integrated Mechanical Care (IMC) – McKenzie based physical therapist owned practice in Tallahassee, Fla
• IMC President - Chad Gray PT, Cert. MDT IMC
  Vice-President and Chief Clinical Officer - Mark Miller PT, Dip MDT
• IMC Mission and Description

IMC Mission and Description

• Mission - To revolutionize the standard of care for musculoskeletal injuries and pain

• Description – The IMC BestCare Method was developed to effectively treat musculoskeletal injury and disease in a non-invasive, conservative manner. Additionally, the method focuses on prevention of injury, educating patients on proper movement.

Outcomes-Accountable™ Care for Musculoskeletal Disorders

Chad Gray, President
Mark Miller, Vice President & Chief Clinical Officer
Integrated Mechanical Care, Inc.
(c) 2014 Integrated Mechanical Care, Inc. / Confidential & Proprietary
IMC Objectives

• Focus on self-insured employers (SIEs)
• Find solutions with rapid and verifiable cost-savings and outcomes improvements for musculoskeletal disorders (MSDs)
• Offer early intervention, outcomes-accountable™ programs to SIE members
• Provide program planning, oversight, and guarantees

Reduce the Cost, Incidence and Prevalence of MSDs and Inappropriate Care

Fortune 500 Case Study – Before IMC

• > $34.7 million in annual claims costs for 12,127 MSD sufferers
• > $285,600 in annual claims costs per 100 MSD sufferers
• > $2,861 in annual claims costs per average MSD sufferer
• > 4,000 images ordered, overall
• > 13% rate of surgeries (vs. a reasonable rate of 3-4%)
• > 45 weeks in an avg. episode of care
• > 50% one-year recurrence rate
• > 44% of cases unresolved

Fortune 500 Case Study: Results of 830 Cases*

• < $18.8 million in expenditures
• < $155,026 per 100 MSD cases
• < $1,062.62 spent PMPM
• < 500 images ordered
• < 2.0% rate of surgeries
• < 30 days in avg. episode of care
• < 10% one-year recurrence rate

Self Outcomes Associated With 100% Steerage

Quantify the Problem and Forecast Savings

Fortune 500 Case Study: Target w/ 100% Steerage

• < $875,426 in expenditures
• < $127,453 per 100 MSD cases
• < $106.21 spent PMPM
• < 46 images ordered
• < 1.3% rate of surgeries
• < 30 days in avg. episode of care
• < 6% one-year recurrence rate
Participate in Steerage Initiatives
Work with RBCHs and SIEs To Triage All MSD Cases

Before IMC
- > $34.7 million in annual claims costs for 12,127 MSD sufferers
- > $285,600 in annual claims costs per 100 MSD sufferer
- > $218 in MSD-related expenses PMPM
- > 4,000 images ordered
- > 45 weeks in an avg. episode of care
- > 50% one-year recurrence rate

Forecast Based on 830 Cases Across 686 Members
- > $34.8 million in annual claims costs for 12,127 MSD sufferers
- > $327,455 in annual claims costs per 100 MSD cases
- > $1,274 in annual claims costs per MSD sufferer
- > 673 images ordered
- < 1.3% rate of surgeries
- < 30 days in an avg. episode of care
- < 6% one-year recurrence rate

Quantify and Guarantee Cost Savings
Replicate Proven Cost-Saving Model

<table>
<thead>
<tr>
<th>Location of MSD</th>
<th>Pre-IMC MSD PMPM</th>
<th>Post-Pilot MSD PMPM</th>
<th>Avg. PMPM Savings for MSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumbar Spine</td>
<td>$187.41</td>
<td>$107.52</td>
<td>$79.89</td>
</tr>
<tr>
<td>Cervical Spine</td>
<td>$163.31</td>
<td>$85.84</td>
<td>$77.47</td>
</tr>
<tr>
<td>Shoulder &amp; Arm</td>
<td>$362.76</td>
<td>$277.89</td>
<td>$84.87</td>
</tr>
<tr>
<td>Knee</td>
<td>$511.72</td>
<td>$277.14</td>
<td>$234.58</td>
</tr>
<tr>
<td>Hip</td>
<td>$80.73</td>
<td>$56.67</td>
<td>$24.06</td>
</tr>
<tr>
<td>Elbow</td>
<td>$80.61</td>
<td>$53.33</td>
<td>$27.28</td>
</tr>
<tr>
<td>Foot &amp; Ankle</td>
<td>$94.18</td>
<td>$33.33</td>
<td>$60.85</td>
</tr>
<tr>
<td>Thoracic Spine</td>
<td>$20.99</td>
<td>$12.77</td>
<td>$8.22</td>
</tr>
<tr>
<td>Wrist-Hand</td>
<td>$33.53</td>
<td>$27.77</td>
<td>$5.76</td>
</tr>
<tr>
<td>Other Body Regions</td>
<td>$44.59</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

Quantify and Guarantee Outcomes
Focus on Patient-Reported Outcomes

<table>
<thead>
<tr>
<th>Area of Improvement on Functional Indices</th>
<th>IMC’s Clinical Data</th>
<th>One of IMC’s Fortune 500 Clients</th>
<th>One of IMC’s S&amp;P 600 Clients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain Score</td>
<td>73.0%</td>
<td>76.5%</td>
<td>80.0%</td>
</tr>
<tr>
<td>Daily Functional Status</td>
<td>40.0%</td>
<td>36.2%</td>
<td>28.0%</td>
</tr>
<tr>
<td>Low Back Function</td>
<td>73.0%</td>
<td>82.7%</td>
<td>63.0%</td>
</tr>
<tr>
<td>Neck Function</td>
<td>69.0%</td>
<td>71.6%</td>
<td>67.0%</td>
</tr>
<tr>
<td>Lower Extremity Function</td>
<td>72.0%</td>
<td>72.4%</td>
<td>68.0%</td>
</tr>
<tr>
<td>Patient Satisfaction</td>
<td>98.2%</td>
<td>98.3%</td>
<td>98.9%</td>
</tr>
<tr>
<td>PMPM Cost Savings</td>
<td>46.0%</td>
<td>46.0%</td>
<td>65.0%</td>
</tr>
</tbody>
</table>
Note How Quickly Cost Savings Accrue

Use Actual Claims To Prove Cost Savings

<table>
<thead>
<tr>
<th>Pre-IMC MSD PMPM (Based on 2012 &amp; 2013 Claims)</th>
<th>Guaranteed MSD PMPM (Based on 40% Cost Savings)</th>
<th>Actual MSD PMPM (1/2014 - 5/2014, n = 147)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$254.11 &amp; $272.48</td>
<td>$163.49</td>
<td>$94.42</td>
</tr>
</tbody>
</table>

Cost Savings @ Current PMPM, Considering Only "n" of 147
Forecasted Cost Savings at 40%, Considering Only "n" of 147

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$314,097.84</td>
<td>$192,258.36</td>
</tr>
</tbody>
</table>

(c) 2014 Integrated Mechanical Care, Inc. / Confidential & Proprietary

Get the Diagnosis Right to Get the Treatment Right

Triage MSD Patients Through IMC’s Reliable Assessment Program

Patients enter medical system with musculoskeletal injuries or conditions

Diagnostic triage sub-group patients into reliable treatment groups

Conservative care supports 95-97% of all patients

Appropriate care generates greater savings & “clean data”

Key Performance Indicators (KPIs)

<table>
<thead>
<tr>
<th></th>
<th>Pre-IMC MSD Company Statistics n = 5,000</th>
<th>Post-Pilot Pre IMC Company Statistics n = 942</th>
<th>Post-Pilot Post IMC Company Statistics n = 972 &amp; 772 members</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT Visits per Referral</td>
<td>17</td>
<td>6.1</td>
<td>5.7</td>
</tr>
<tr>
<td>Advanced Imaging Procedures</td>
<td>25%</td>
<td>3.3%</td>
<td>3.1% (24)</td>
</tr>
<tr>
<td>Pain Injections or Procedures</td>
<td>10%</td>
<td>3.2%</td>
<td>2.0% (20)</td>
</tr>
<tr>
<td>Surgical Procedures</td>
<td>15%</td>
<td>3.8%</td>
<td>1.0% (8)</td>
</tr>
<tr>
<td>Beneficiary Satisfaction Rate</td>
<td>--</td>
<td>99.3%</td>
<td>96.3%</td>
</tr>
</tbody>
</table>

(c) 2014 Integrated Mechanical Care, Inc. / Confidential & Proprietary
Promote Breakthrough Results
Deliver Unprecedented Value to RBCHs and SIEs

- Individual
  - Improved speed to recovery & socioeconomic status

- Organizational Outcomes
  - Enhanced cost reductions & cost containment
  - Improved human-capital ROI

- Societal Outcomes
  - Improved population health & socioeconomic development

Medical Model of Disease

- Signs/symptoms analyzed
- Pathology is determined
- Treatment corrects pathology
- Signs/symptoms disappear

Drive Savings with a Clinical vs. Administrative Solution

Inter-Tester Reliability → Appropriate Treatment
Appropriate Treatment → Better Patient Outcomes
Better Outcomes → Reduced Costs & Human-Capital ROI
QUESTIONS?

McKenzie Institute, USA Fellowship
Daemen College OMPT Fellowship
Cervicogenic dizziness post-concussion: A case report

Saviola K, Schenk R, Coleman T
Catholic Health System, Buffalo, NY
Daemen College OMPT Fellowship

Research question
Will a 6 week cervical stabilization program improve functional outcomes and performance on the cervical relocation test in a patient with cervicogenic dizziness?

Case description
A 23 year old former collegiate soccer player was screened and managed for post-concussion syndrome and vestibular involvement prior to the physical therapy (PT) initial examination. The PT exam revealed constant and unchanging cervical pain. Of particular concern to the patient was an inability to visually focus and dizziness that followed reading, computer work, and turning of the head.
Recruitment of the deep neck flexors

Intervention and Outcomes – Phase II

- Intervention – 6 week stabilization program emphasizing recruitment of the deep neck flexors and extensors.
- The outcomes related to Phase II management included an improvement in the cervical relocation test to an error of less than 4.5 degrees for each of the 6 attempts
- Improvement in the NDI to 8%
- Improvement in function on the FOTO tool to a score greater than predicted