Helpful Readings

• Article by Smart KM et al, 2010:
  • Clinical indicators of nociceptive, peripheral neuropathic, and central mechanisms of musculoskeletal pain. A Delphi survey of expert clinicians.

• International Assoc. for Study of Pain (IASP)
  • http://www.iasp-pain.org/Taxonomy?navItemNumber=576

• Resources for intervention:
  • Why do I Hurt? By Adriaan Louw
  • Painful Yarns by G. Lorimer.Moseley
  • Explain Pain by David Butler and Lorimer Moseley
A Little Background...

- I am speaking to you as a physical therapist
- The human movement system is the body system for which physical therapists are responsible.
- My expertise is in the examination, diagnosis and treatment of conditions affecting the neuromusculoskeletal system.
- Pain is the most common complaint
Is There an Ideal Way to Move or Is Any Pattern Acceptable?

Impaired shoulder motion

Corrected shoulder motion
Lumbar Extension Pattern with Return from Forward Bending
Role as Movement System Experts

• Collaborate with physicians to identify the region causing pain: sorting diagnostic dilemmas
  • An 84 year old male with knee pain
    • Pain in knee: from back, hip, or knee?
    • Knee replacement without resolution of knee pain
    • Subsequently knee pain associated with lumbar extension
  • Need to match the radiological images with how a person moves within and across body regions – Do the radiological findings match the clinical presentation?

• Collaborate with other exercise providers to direct specificity of programs
A Challenge: Keeping the Acute Problem From Becoming Chronic

• Acute symptoms often subside with
  • time
  • a variety of interventions addressing symptoms

• Recurrence is common
  • Patho-anatomic structures considered the cause
  • The impaired movement not considered as cause
    • Therefore has not been identified & addressed.

• To minimize recurrence –
  • identify the movement cause of pain & contributing factors
LET'S RETURN TO “PAIN”

Cartesian Model:
An unpleasant sensory experience associated with tissue damage
Current Definition of Pain (IASP)

• An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.
Pain (IAASP)

- Pain is always subjective
- Involves both ascending and descending pathways of the nervous system
Types of pain

- Traditional:
  - Mechanical vs. Non-mechanical
  - Acute vs. Chronic (persists beyond normal healing time of tissues)

- More recent:
  - Mechanisms-based classification: classify pain according to the underlying neurophysiological mechanisms for the generation or maintenance of pain
Categories of Pain and Definitions
Mechanism-Based Classification

- *Nociceptive* pain (more like traditional def)
- *Neuropathic* pain
- *Nociplastic* pain

- Importance of understanding the complex biological and psycho-social nature of pain
Model to Consider

Pain Types Based on Mechanism

- **Nociceptive**
  - Define
  - Measure: Hx and Exam

- **Neuropathic**
  - Define
  - Measure: Hx and Exam

- **Nociplastic**
  - Define
  - Measure: Hx and Exam

Psycho-Social Factors
- Vulnerability
- Resilience

Movement
- Effect of movement on pain

**Psycho-Social Factors**

**Movement**
Nociceptive Pain (IASP)

- Pain that arises from actual or threatened damage to non-neural tissue and is due to the activation of nociceptors
  - Chemical (inflammatory), mechanical, or thermal
  - Normal function of somatosensory system

Ankle sprain
Clinical Indicators of Nociceptive Pain

*(Smart, 2010)*

**Table 2: Subjective**

- Clear, proportionate mechanical/anatomical nature to aggravating and easing factors

- Pain associated with and in proportion to trauma or a pathological process (inflammatory nociceptive) or movement/postural dysfunction (ischemic nociceptive).
Clinical Indicators of Nociceptive Pain
(Smart, 2010)

Table 3: Clinical Examination

- Clear, consistent and proportionate mechanical/anatomical pattern of pain reproduction on movement/mechanical testing of target tissues
- Localized pain on palpation.

Examples of shoulder pain or LBP from videos
NOTE:

- The **Verbal Numeric Rating Scale (VNRS)** or the **Visual Analog Scale (VAS)** or a **Pain Diagram** are good patient reported outcome measures for pain but are not specific to one type of pain. The patient response is what helps you categorize the pain mechanism.
Neuropathic Pain (IASP)

- Pain caused by a lesion or disease of the somatosensory nervous system
  - Peripheral (primary lesion is in PNS)
    - Carpal tunnel (median n)
  - Central (distinct lesion or ds in CNS)
    - CVA or SCI
Clinical Indicators of Peripheral Neuropathic Pain
(Smart, 2010)

Table 4: Subjective

- Pain variously described as burning, shooting, sharp, aching or electric-shock-like.
- History of nerve injury, pathology or mechanical compromise. Pain in association with other neurological symptoms (e.g. pins and needles, numbness, weakness).
- Pain referred in a dermatomal or cutaneous distribution.
Clinical Indicators of Peripheral Neuropathic Pain
(Smart, 2010)

Table 5: Clinical Examination

- Pain/symptom provocation with mechanical/movement tests (e.g. Active/Passive, Neurodynamic, i.e. SLR, Brachial plexus tension test, Tinel’s) that move/load/compress neural tissue.

- Pain/symptom provocation on palpation of relevant neural tissues. Positive neurological findings (including altered reflexes, sensation and muscle power in a dermatomal/myotomal or cutaneous nerve distribution).
Measure of Neuropathic Pain

Pain Detect
https://www.pain-detect.de/fileadmin/pain-detect.de/media/painDETECT-Q_English.pdf
Nociplastic Pain (IAFP)

• Pain that arises from altered nociception despite no clear evidence of actual or threatened tissue damage causing the activation of peripheral nociceptors or evidence for disease or lesion of the somatosensory system causing the pain.
Sensitization (IASP)

• Increased responsiveness of nociceptive neurons to their normal input and/or recruitment of a response to normally subthreshold inputs
  • Central (in the CNS)
  • Peripheral (receptive fields of peripheral nn)
Peripheral Sensitization

Products of tissue damage potentiate nociceptor response

- Extracellular protons
- Arachidonic acid
- Bradykinin
- Histamine
- Serotonin
- Prostaglandins
- Nucleotides
- Nerve growth factor (NGF)

Nociceptors add to inflammatory response:

- Substance P
- Calcitonin gene-related peptide (GRP)
- ATP
Central Sensitization

Increased responsiveness of nociceptive neurons in the CNS to their normal or subthreshold afferent input (IASP)

Increased excitability

Decreased inhibition
Central Sensitization

- Response **magnitude** to noxious stimuli **increases**
- Response **threshold** to noxious stimuli **decreases**
- Enhanced response to **non-noxious stimuli**
- Spontaneous activity increases
- Receptive field increases
Clinical Indicators of Central Pain

(Smart, 2010)

Table 6: Central Pain Subjective

- Disproportionate, non-mechanical, unpredictable pattern of pain provocation in response to multiple/non-specific aggravating/easing factors.
- Pain persisting beyond expected tissue healing/pathology recovery times.
- Pain disproportionate to the nature and extent of injury or pathology.
- Widespread, non-anatomical distribution of pain.
Clinical Indicators of Central Pain

(Smart, 2010)

Table 7: Clinical Examination

- Disproportionate, inconsistent, non-mechanical/non-anatomical pattern of pain provocation in response to movement/mechanical testing.
- Diffuse/non-anatomic areas of pain/tenderness on palpation
- Positive findings of hyperalgesia (primary, secondary) and/or allodynia
Clinical Indicators of Central Pain
(Smart, 2010)

• Hyperalgesia
  • Increased pain from a stimulus that normally provokes pain

• Allodynia
  • Pain due to a stimulus that does not normally produce pain
Other Measures When You Suspect Nociplastic Pain

- Pressure Pain Threshold (PPT)
  - Use algometer in area of tissue damage and other areas.
- Conditioned Pain Modulation (cold)
- 2 point discrimination
- Laterality (phone app OrientateFree)
Individuals with Central Sensitization (Magnified Illness Behavior)

- The pain is real and you are treating people, not just joints
- Shouldn’t lead to moral judgment or rejection
- Utilize motivational interviewing
Individuals with Central Sensitization (Magnified Illness Behavior)

- Treatment must include education on neuroscience of pain
- Include team of professionals (counseling and pain management)
- Keep program simple – graded activity exposure
Model to Consider

Pain Types Based on Mechanism

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Psycho-Social Factors
- Vulnerability
- Resilience

Movement
- Effect of movement on pain
Pain Associated Psychological Distress

- Vulnerability
- Resilience

Lentz T, et al; JOSPT, May 2016
Psycho-Social Factors

**Vulnerability:**
Negative Mood:
- Anxiety: 2 questions on Problem Centered History
- Depression: 2 questions on Problem Centered History

Fear Avoidance:
- FABQ (Fear Avoidance Belief Questionnaire)
- TSK – 11 (Tampa Scale of Kinesiophobia)
- PCS (Pain Catastrophizing Scale)

**Resilience:**
Self-Efficacy
- Pain Self Efficacy Questionnaire
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**Psycho-Social Factors**

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**Movement**

- Effect of movement on pain

Model to Consider
Movement (includes alignment)

- Determine the effect of movement on pain
- Rank the results from high to low
  - High - predictable/very modifiable
  - Medium - partially
  - Low – pain not modifiable by movement
Radar Plot: Mapping Clinical Presentation
Introduction: Treatment

• Pain is a critical protective device

• Pain does not provide an accurate MEASURE of the state of the tissues

• Pain is a conscious process that combines actual tissue damage with your PAST, PRESENT, and FUTURE experiences
Introduction: Treatment

• Pain is a complex process that can be outside your awareness and control

• Pain hurts where your brain “THINKS” the problem is, not necessarily where the problem really is

• Nociception is neither sufficient or necessary for pain

• Neural networks that produce pain become more sensitive when pain persists
Case Example: Pediatric Hip Pain

- 12 y/o female
- Pain: 5-9/10 (B) deep, anterior hips
- Present for last several months
- Got better with PT elsewhere but then she fell out of bed and the pain severely worsened
- C/O popping, clicking and snapping
Case #1: Pediatric Hip Pain

• Activities: gymnastics (level 5) and volleyball, wants to run

• Significant psychosocial history: Father died earlier this year after a year of terminal cancer treated at home
Initial presentation: Case #1
Initial presentation: Case #1

Treatment:
• Exercises
• Tape behind knees to prevent hyperextension
• Gait training
  • Walking with a rollator walker or crutches
  • Forward/backward weight shifting in the treadmill
Case Example

• Seen for 3 visits and did GREAT!
  • Nearly pain free
  • About to start running

• 4\textsuperscript{th} visit: Suddenly worse than before
  • Unable to bear weight on right leg
  • Numbness/tingling
  • No longer going to school
  • MRI on lumbar spine and hip: negative

• Now what?
Regroup: This Doesn’t Make Sense

• What did we do?
  • Pain science education using age appropriate metaphors
  • Answered patient and her mother’s questions calmly
  • Re-affirm plan of care; include counseling
Regroup: This Doesn’t Make Sense

- What could we have done to improve our care?
  - Administered a self report measure
  - Measured PPT
  - More motivational interviewing
  - Provided a list of resources for counseling
Thank You