Multidimensional Assessment of Pain for Clinical Research and Practice

Pain Short Course - UM

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Disclosures

- Consultant to Community Health Focus Inc.
- Immediate Past-President of the American Pain Society
- Funded for research by NIH

There will be no use of off-label medications in this presentation.
Acute pain is largely treatable...
Not so much for chronic pain
Thinking Differently about Chronic Pain (1)

- Acute pain often has 1:1 relationship between tissue damage and pain.
  - *Chronic pain does not*
  - Similar in mechanism to an emotion but experienced as a bodily sensation

Thinking Differently about Chronic Pain (2)

- Damaged tissue and pain are *not* the same thing
Thinking Differently about Chronic Pain (3)

- Pain is a **Perceptual Experience** formed in the brain
  - Other perceptual experiences with flexible biological associations include the following:
    - hunger, itch, tickle, urinary urgency, orgasm
Thinking Differently about Chronic Pain (4)

- Treating a perception requires different skills than fixing damaged tissues
- Pain Treatment too often focuses on fixing a body part and *not* on fixing pain perception or how pain is processed
Functioning Detector

• Beeps when smoke is present
• Warns of fire
• Behavior:
  • Search for fire
  • Put out fire
• Detector is silent when fire is out
• Acute/Nociceptive pain
Functioning Detector

- Beeps when smoke is present
- Warns of fire
- Behavior:
  - Search for fire
  - Put out fire
- Detector is silent when fire is out
- Acute/Nociceptive pain

Broken Detector

- Beeps due to processing malfunction
- Behavior:
  - Search for fire?
  - Throw water?
- Better Behavior:
  - Fix the processor in the detector
- Chronic / Central Pain
What’s inside a broken pain detector?
Neurotransmitters for Pain Processing

Norepinephrine
Concentration
Circadian rhythms
Attention
Stress
Energy
Neurotransmitters for Pain Processing

Norepinephrine
- Concentration
- Circadian rhythms
- Attention
- Stress
- Energy

Serotonin
- Well-being
- Sleep
- Affect /Mood
- Appetite
Norepinephrine
Concentration
Circadian rhythms
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Stress
Energy

Serotonin
Well-being
Sleep
Affect /Mood
Appetite

Dopamine
Attention
Pleasure
Reward

Neurotransmitters for Pain Processing
Neurotransmitters for Pain Processing

**Norepinephrine**
- Concentration
- Circadian rhythms
- Attention
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- Energy

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- Well-being
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**Dopamine**
- Attention
- Pleasure
- Reward
Neurotransmitters for Pain Processing

**Glutamate**
Major Exciter of CNS, Synaptogenesis and neurogenesis

- **Norepinephrine**
  - Concentration
  - Circadian rhythms
  - Attention
  - Stress
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- **Serotonin**
  - Well-being
  - Sleep
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- **Dopamine**
  - Attention
  - Pleasure
  - Reward

- **Cognitive Function**
Neurotransmitters for Pain Processing

Glutamate
Major Exciter of CNS, Synaptogenesis and neurogenesis

Norepinephrine
Concentration
Circadian rhythms
Attention
Stress
Energy

Serotonin
Well-being
Sleep
Affect /Mood
Appetite

Cognitive Function

Dopamine
Attention
Pleasure
Reward

GABA
Major Inhibitor of CNS, Sleep/wake cycle
Shared Neurotransmitters Explain

- The complexity of chronic pain presentation

Shared Neurotransmitters Explain

- The complexity of chronic pain presentation

- Sleep, Pain, Affect, Cognition, Energy

Shared Neurotransmitters Explain

- The complexity of chronic pain presentation

- **Sleep, Pain, Affect, Cognition, Energy**

- New targets for treating pain perception

Multi-Dimensional Pain Assessment

- Documents targetable elements of chronic pain perception
- Monitors chronic pain perception over time
- Helps phenotype pain for research
How do you assess a pain perception?
Traditional Pain Assessment

Pain
Intensity
Location, Quality
Distribution
Temporality

Adapted from Williams, DA. Curr Opin. Urol. 2013;23(6) 554-9
**Intensity**

### Visual Analogue Scale (VAS)

*Figure 1. Visual Analogue Scale used to measure Pain.*

### 0-10 Numeric Pain Intensity Scale *

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>No pain</td>
<td>Moderate pain</td>
<td>Worst possible pain</td>
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### Verbal Rating Scale: Discomfort Rating

0 - Pain or Discomfort - none

1 - Pain or Discomfort - I am aware of it, I think about it

2 - Pain or Discomfort - I am aware of it, I think about it but I can ignore it at times.

3 - Pain or Discomfort - I can’t ignore it, but I can do my usual activities.

4 - Pain or Discomfort - It is difficult for me to concentrate; I can only do easy activities.

5 - Pain or Discomfort - Such that I can’t do anything.

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Brief Pain Inventory

### EMA Pain

### Ex: Pain Diary

**MONITORING PAIN DIARY**

**Instructions:**
1. Keep a record of any pain you experience during any of the following periods with a 7 day diary.
2. Record how intense your pain was by rating it on a scale of 1 to 10 (1=not very painful to 10=highly painful).
3. Record what you were doing or the situation you were in when you experienced the pain.
4. Record your thoughts at the time of experiencing the pain.

This will help you to develop more awareness about your experiences of physical pain to help you identify strategies and techniques to help manage pain.

<table>
<thead>
<tr>
<th>DAY</th>
<th>Brief description of type of pain</th>
<th>RATE 1-10</th>
<th>Situation/What you were doing</th>
<th>What you were thinking at the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
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<tr>
<td>Tuesday</td>
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<td>Wednesday</td>
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<td>Thursday</td>
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<td>Friday</td>
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<td>Saturday</td>
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<tr>
<td>Sunday</td>
<td></td>
<td></td>
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</tbody>
</table>
Domains of Pain Assessment

Adapted from Williams, DA. Curr Opin. Urol. 2013;23(6) 554-9
Sleep

- Sleep Disturbances
  - PROMIS¹
  - MOS²
  - PSQI³
- Sleep-related Impairment
  - PROMIS¹

Focal vs Wide-Spread Pain

- **Body Maps**
- **Assess for local Vs. Wide-spread pain**
- **In IC, only 19% focal**

Fibromyalgia-ness

• WPI+SS ≥ 13 cut point

FDC, fibromyalgia diagnostic criteria
Affect and Chronic Pain

IASP Definition of Pain:
An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage\(^1\)

Affective Vulnerability:
Highly predictive of first onset of chronic pain (e.g., TMD).\(^2\)

Neuroimaging Findings:
Compared to acute pain, chronic pain appears more like an emotional event than a sensory event.\(^3,4\)

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Psychiatric Co-Morbidities
# Psychiatric Co-Morbidity in Chronic Pain

<table>
<thead>
<tr>
<th></th>
<th>Depression</th>
<th>Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Population:</strong></td>
<td>6.6%</td>
<td>18.1%</td>
</tr>
<tr>
<td><strong>Chronic Pain:</strong></td>
<td></td>
<td>30-54%</td>
</tr>
</tbody>
</table>

Negative Affect

- Depression/Dysphoria
  - CES-D\(^1\)
  - PHQ-9\(^2\)
  - PROMIS\(^3\)

- Anxiety
  - STAI\(^4\)
  - GAD-7\(^5\)
  - PROMIS\(^3\)

- Anger
  - STAXI\(^6\)
  - PROMIS\(^3\)

**Negative Affect:**
Positive Affect / Resilience

- Positive/Negative Affect
  - PANAS\(^1\)
- Affect Balance\(^2\)
- Hardiness
- Grit
  - Short Grit Scale\(^3,4\)
- Optimism
- Determination/courage
- Satisfaction with life
  - SWL\(^5\)
- Benefit Finding
- Gratitude
- Forgiveness
- Subjective Well-being
  - SWBS\(^6\)
  - PROMIS Affect/Well-being\(^7\)
- Sense of Coherence

**Dyscognition**
- Perceived Problems
  - MASQ\(^4\)
  - MISCI\(^5\)

**Fatigue**
- Multidimensional Fatigue
  - MFI\(^6\)
  - PROMIS\(^1\)


Medical History
- Demographics
- Co-morbid medical conditions
- Current Treatments
- Medical History
- Family History

Trauma/Stress
- Trauma
  - CTES/RTES\textsuperscript{7}
- Stress
  - PSS\textsuperscript{8}

Personality
- 5 Factor Model
  - Neuroticism
  - Extroversion
  - Openness
  - Conscientiousness
  - Agreeableness
- IPIP\textsuperscript{9}
- TIP\textsuperscript{10}


## Personality Disorders in Chronic Pain Patients

<table>
<thead>
<tr>
<th>Personality Disorders</th>
<th>gen. pop: 5%-15%</th>
<th>chronic pain: 51%-58%</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Cluster A: Odd/Eccentric</th>
<th>Cluster B Emotional/Erratic</th>
<th>Cluster C Anxious/Fearful</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Paranoid</td>
<td>Antisocial</td>
<td>Avoidant</td>
</tr>
<tr>
<td>*Schizoid</td>
<td>*Histrionic</td>
<td>*Dependent</td>
</tr>
<tr>
<td>Schizotypal</td>
<td>Narcissistic</td>
<td>OCPD</td>
</tr>
<tr>
<td></td>
<td>Borderline</td>
<td></td>
</tr>
</tbody>
</table>

44% 31% 25%

**Personality Disorders**
Predictive of transition from acute to chronic status
Sub clinical P.D. impacts pain and treatment compliance

<table>
<thead>
<tr>
<th>Pain Beliefs</th>
<th>Coping Resources</th>
<th>Expectancies</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Multi-component</td>
<td>• Coping Strategies</td>
<td>• Treatment Expectancy and credibility</td>
</tr>
<tr>
<td>• SOPA¹</td>
<td>• CSQ⁵</td>
<td>• TEC⁹</td>
</tr>
<tr>
<td>• PBPI²</td>
<td>• CPCI⁶</td>
<td></td>
</tr>
<tr>
<td>• BBCA³</td>
<td>• Catastrophizing</td>
<td></td>
</tr>
<tr>
<td>• Locus of Control</td>
<td>• PCS⁷</td>
<td></td>
</tr>
<tr>
<td>• BPCQ⁴</td>
<td>• Self-Efficacy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• PSE⁸</td>
<td></td>
</tr>
</tbody>
</table>


**Expectancies:** ⁹Smeets RJ, et al., Treatment expectancy and credibility are associated with the outcome of both physical and cognitive-behavioral treatment in chronic low back pain. The Clinical journal of pain. 2008;24(4):305-15.
Domains of Pain Assessment

Adapted from Williams, DA. Curr Opin. Urol. 2013;23(6) 554-9
**Functioning**

- Multidimensional Functioning
  - SF-36\(^1\)
  - WHO-DAS 2.0\(^2\)
- Pain Interference
  - BPI\(^3\) (interference)
- Disability
  - PDI\(^4\)

**Pain Behaviors**

- PROMIS\(^5\)

**Fear Avoidance**

- TSK\(^6\)

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\(^3\)Cleeland C. The Brief Pain Inventory: User Guide. Houston, TX: MD Anderson Cancer Center; 2009.  

Substance Use

- Tobacco
  - 5FTQ
- Alcohol
  - 6CAGE
  - 7AUDIT
- Opiates
  - 8ORT
  - 9COWS
- Illicit Drugs
  - 10DAST

Substance Usage:

- Illicit Drugs: Webster, LR & Webster, R (2005), Pain Med 6(6):432.
Domains of Pain Assessment

- Environmental Influences
  - Behavioral Response
    - Cognitive Response
      - Historical Experiences
        - SPACE
          - Pain

Adapted from Williams, DA. Curr Opin. Urol. 2013;23(6) 554-9
**Social**
- Multicomponent Social Functioning
  - WHYMPI
- Social Enfranchisement
  - PE

**Family**
- Dyadic Adjustment
  - DAS

**Work**
- Work Productivity/Impairment
  - WPAI

---


**Family**: 3Spanier GB. The measurement of marital quality. J Sex Marital Ther

Domains of Pain Assessment

- **Pain**
  - Intensity
  - Location, Quality
  - Distribution
  - Temporality

- **Cognitive Response**
  - Affect
  - Expectancies
  - Personality

- **Behavioral Response**
  - Pain interference
  - Expectations
  - Self-Efficacy

- **Historical Experiences**
  - Medical history
  - Coping Resources
  - Family History
  - Locus of Control

- **Environmental Influences**
  - Social
  - Friends
  - Risky Behaviors
  - Family
  - Pain interference

Adapted from Williams, DA. Curr Opin. Urol. 2013;23(6) 554-9
Do we need to assess everything?
How do you use assessments to treat a pain perception?
Persistent Pain Complaint

History/Physical

Red Flags
Specialist Referrals

Diagnosis

Investigations

**Diagnostic** – 65 y/o female, retired, R-KOA, possible FM, Pain 7/10

Adapted from Macfarlane et al. Ann Rheum Dis, 2017;76:318-328; Lee, et al., BJA 2014; 112:16-24; Peterson et al, VA ESP Project #09-199, 2017
Sleep: poor, non-restorative
Pain: wide-spread, FM-ness=11 (subclinical FM)
Affect: Anxiety>Depression
Cognition: complains of memory and concentration problems
Energy: fatigue early in day and late at night
Childhood Trauma: sister died in house fire
Beliefs: Her pain is God’s punishment for failing to save sister’s life
Functioning: both mental and physical functioning have become worse
Social: Husband is 8 years older than her, misses companion for activities

Adapted from Macfarlane et al. Ann Rheum Dis, 2017;76:318-328; Lee, et al., BJA 2014; 112:16-24; Peterson et al, VA ESP Project #09-199, 2017
Persistent Pain Complaint

History/Physical

Red Flags
Specialist Referrals

Diagnosis

Investigations

Multi-Dimensional Needs Assessment, Improvement Goals, & Treatment Planning

Education

Self-Management

if insufficient effect

Multi-Component CBT
- Mood, Function
- Coping, sleep, pain

Pharmacotherapy
- Severe Pain
- Sleep

Fitness
- Function
- Pain

Other Therapies
- Massage
- Hydrotherapy

Adapted from Macfarlane et al. Ann Rheum Dis, 2017;76:318-328; Lee, et al., BJA 2014; 112:16-24; Peterson et al, VA ESP Project #09-199, 2017
Targets

- Self-Management
  - Behavioral Sleep Strategies
  - Pacing
  - Social

- Physical Therapy
  - Functional status

- Cognitive Behavioral Therapy
  - Anxiety
  - Beliefs
Persistent Pain Complaint

History/Physical

Red Flags
Specialist Referrals

Diagnosis

Investigations

Multi-Dimensional Needs Assessment, Improvement Goals, & Treatment Planning

Education

Self-Management

Multi-Component CBT
- Mood, Function
- Coping, sleep, pain

Pharmacotherapy
- Severe Pain
- Sleep

Fitness
- Function
- Pain

Other Therapies
- Massage
- Hydrotherapy

Monitor Symptomatic Change

Not improving
- Repeat Needs assessment
- Specialist Referral

Improving
- Regular Review / Pt. centric care

Adapted from Macfarlane et al. Ann Rheum Dis, 2017;76:318-328; Lee, et al., BJA 2014; 112:16-24; Peterson et al, VA ESP Project #09-199, 2017