Pain Management: Rationale for the BioPsychoSocial Perspective

MI-CCSI

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Disclosures

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

There will be no use of off-label medications in this presentation.
Chronic Pain Numbers

100 Million People
- US

150 Million
- 37 Countries

More people have Chronic Pain than Diabetes, Heart Disease, and Cancer Combined

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic Pain</td>
<td>100 Million</td>
</tr>
<tr>
<td>Diabetes</td>
<td>29.1 Million</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>27.6 Million</td>
</tr>
<tr>
<td>Cancer</td>
<td>13.7 Million</td>
</tr>
</tbody>
</table>

= 1 Million individuals
Most Pain Care Visits occur within Primary Care

Primary Care Physicians Receive Little Training in Pain Management

- 80% of American Medical Schools have no formal pain education
- Those that do, report 5 or fewer hours
  - Emphasis of education is often cellular and subcellular rather than interpersonal or social in nature
- Only 34% of physicians reported feeling comfortable treating chronic pain
  - Only 1% found it a satisfying practice

Survey of Primary Care Physicians treating Chronic Pain

- 34% no longer accepted new patients with chronic pain
- 79% currently prescribe opioids for chronic pain
- 72% of physicians lacked alternative treatments to opioids
- 87% of patients were unwilling to try non-pharmacological treatment

Mi-CCSI Chronic Pain Primary Care Survey (2018). N=217, Health systems Western and mid-Michigan
Biomedical Model
Interventional Pain Medicine

- Procedure Driven
- Focus on curing/fixing

Patient is passive recipient

Biopsychosocial model
Interdisciplinary Pain Management

- Focus on multidisciplinary teams
- Focus on pain management

Patient is active participant

## How good is our black bag for treating chronic pain?

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Impact on Chronic Pain</th>
</tr>
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<tbody>
<tr>
<td>Long term opioids</td>
<td>32% reduction</td>
</tr>
<tr>
<td>Pain drugs generally</td>
<td></td>
</tr>
<tr>
<td>(across classes)</td>
<td>30% - 40% get</td>
</tr>
<tr>
<td></td>
<td>40% - 50% relief</td>
</tr>
<tr>
<td>Spinal fusion</td>
<td>75% still have pain</td>
</tr>
<tr>
<td>Repair herniated disk</td>
<td>70% still have pain</td>
</tr>
<tr>
<td>Repeat Surgery</td>
<td>66% still have pain</td>
</tr>
<tr>
<td>Spinal cord stimulators</td>
<td>61% still in pain after 4 yrs.</td>
</tr>
<tr>
<td></td>
<td>average pain relief 18% across studies</td>
</tr>
</tbody>
</table>

Are Invasive Procedures Effective for Chronic Pain? A Systematic Review

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Abstract

Objective: To assess the evidence for the safety and efficacy of invasive procedures for reducing chronic pain and improving function and health-related quality of life compared with sham (placebo) procedures. Design: Systematic review with meta-analysis. Methods: Studies were identified by searching multiple electronic databases, examining reference lists, and communicating with experts. Randomized controlled trials comparing invasive procedures with identical but otherwise sham procedures for chronic pain conditions were selected. Three authors independently extracted and assessed study characteristics and assessed Cochrane risk of bias. Two subsets of data on back and knee pain, respectively, were pooled using random-effects meta-analysis. Overall quality of the literature was assessed through Grading of Recommendations, Assessment, Development, and Evaluation. Results: Twenty-five trials (20,000 participants) were included in the review assessing the effect of invasive procedures over sham. Conditions included low back (N = 7 trials), arthritis (4), angina (4), abdominal pain (3), endometriosis (3), biliary colic (3), and migraine (3). Thirteen trials (68%) reported an adequate concealment of allocation. Fourteen studies (56%) reported on adverse events. Of these, the risk of any adverse event was significantly higher for invasive procedures (12%) than sham procedures (4%); risk difference = 0.06, 95% confidence interval [CI] = 0.01 to 0.09, P < 0.01, I² = 65%}. In the two meta-analysis subsets, the standardized mean differences for reduction of low back pain in seven studies (N = 446) was 0.18 (95% CI: −0.14 to 0.51, P = 0.26, I² = 62%), and for knee pain in three studies (N = 416) it was 0.04 (95% CI: 0.11 to 0.05, P = 0.32, I² = 48%). The relative contribution of within group improvement in sham treatments accounted for 87% of the effect compared with active treatment across all conditions. Conclusions: There is little evidence for the specific efficacy beyond sham for invasive procedures in chronic pain. A moderate amount of evidence does not support the use of invasive procedures as compared with sham procedures for patients with chronic back or knee pain. Given their high cost and safety concerns, more rigorous studies are required to confirm the efficacy of invasive procedures for patients with chronic pain.
We Need to Approach Chronic Pain Differently
# How is Pain Classified?

<table>
<thead>
<tr>
<th>Time</th>
<th>Body Location</th>
<th>Suspected Etiology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Vs Chronic</td>
<td>Head, Neck, Back, Pelvis</td>
<td>Cancer, Rheumatic, etc.</td>
</tr>
</tbody>
</table>

## Newest Classification: Pain Mechanisms

- **Nociceptive**
  - Peripheral damage or inflammation

- **Neuropathic**

- **Central**

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Nociceptive Pain
(mechanical, thermal, chemical)
Neuropathic Pain

Peripheral

Central

Post-Stroke
Central (Nociplastic) Chronic Overlapping Pain Conditions

<table>
<thead>
<tr>
<th>COPCs</th>
<th>US Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irritable Bowel Syndrome</td>
<td>44 Million</td>
</tr>
<tr>
<td>Temporomandibular Disorder</td>
<td>35 Million</td>
</tr>
<tr>
<td>Chronic Low Back Pain</td>
<td>20 Million</td>
</tr>
<tr>
<td>Interstitial Cystitis / Bladder Pain Syndrome</td>
<td>8 Million</td>
</tr>
<tr>
<td>Migraine Headache</td>
<td>7 Million</td>
</tr>
<tr>
<td>Tension Headache</td>
<td>7 Million</td>
</tr>
<tr>
<td>Endometriosis</td>
<td>6 Million</td>
</tr>
<tr>
<td>Vulvodynia</td>
<td>6 Million</td>
</tr>
<tr>
<td>Fibromyalgia</td>
<td>6 Million</td>
</tr>
<tr>
<td>Myalgic Encephalopathy / CFS</td>
<td>4 Million</td>
</tr>
</tbody>
</table>

Mechanisms of Pain

**Nociceptive and Inflammatory**
- Noxious Peripheral Stimuli
- Inflammation

**Neuropathic**
- Peripheral or Central damage

**Centrally Driven Pain**
Mechanisms of Pain

Nociceptive and Inflammatory

Noxious Peripheral Stimuli

Inflammation

Neuropathic

Peripheral or Central damage

Centrally Driven Pain

Adapted from Woolfe, CJ, Ann Intern Med. 2004;140:441-451
Neurobiological perspective

Brain regions associated with pain processing involve both sensory and affective/cognitive regions

- **Sensory / discriminative dimension**
  - Somatosensory cortices (S1, S2)
  - Dorsal posterior insula

- **Affective / Cognitive dimensions**
  - Anterior insula
  - Prefrontal cortex
  - Anterior cingulate cortex
  - Thalamus
  - Amygdala
  - Hippocampus

**Neurobiological perspective**

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I still feel pain

Chronic Pain has Three Components:
The BioMedical Model
Focuses on 1 of Them

Sensory
(where it is and intensity)

Historical
Biomedical
Emphasis

Affect
(emotional valence)

Pain

Cognitive
(evaluation and meaning)
Thinking Differently about Pain

- Damaged tissue and pain are not the same thing
- Sometimes they occur together, so they seem to be the causal
- Nociception provides bodily information that may or may not be interpreted as pain
Thinking Differently about Chronic Pain

- 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

- Treating a perception requires different techniques than fixing damaged tissues
CNS Neurotransmitters Influencing Pain

**Facilitation**
- Glutamate and EAA
- Substance P
- Nerve growth factor
- Serotonin (5HT$_{2a,3a}$)
- Gabapentinoids, ketamine
- Anti-migraine drugs (– triptans), cyclobenzaprine

**Inhibition**
- Descending anti-nociceptive pathways
- Norepinephrine-serotonin (5HT$_{1a,b}$), dopamine
- Opioids
- Cannabinoids
- GABA
- Tricyclics, SNRIs, tramadol
- Low dose naltrexone
- Gammahydroxybutyrate, moderate alcohol consumption
- No knowledge of endocannabinoid activity but this class of drugs is effective

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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
Neurotransmitters for Pain Processing

**Norepinephrine**
- Concentration
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- Energy

**Dopamine**
- Attention
- Pleasure
- Reward

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Cognitive Function
Glutamate
Major Exciter of CNS, Synaptogenesis and neurogenesis

Norepinephrine
Concentration
Circadian rhythms
Attention
Stress
Energy

Serotonin
Well-being
Sleep
Affect /Mood
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Neurotransmitters for Pain Processing
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  - Pleasure
  - Reward

- **Serotonin**
  - Well-being
  - Sleep
  - Affect /Mood
  - Appetite

- **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**
- **SPACE** represents new targets for treating pain perception

So what’s a doctor to do?
Recommendations in Multiple Federal Documents

Self-Management, Evidence-Based, Patient-Centric, Multi-Modal Pain Care
VA’s Stepped Care Model of Pain Management

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

Improving
- Specialist Referral
- Regular Review /Pt. centric care

If insufficient effect

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

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Mixing in Pain Perception
Pain Care Pathway

Persistent Pain Complaint

History/Physical

Red Flags
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How to ERASE S.P.A.C.E.

Emotions
Reflections
Actions
Sleep
Environment

Sleep, Pain, Affect, Cognitive changes, Energy deficits
ERASE

Emotions

Altering pain perception through Emotions
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>30-54%</td>
<td></td>
</tr>
</tbody>
</table>

## Personality Disorders in Chronic Pain Patients

<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>

| Personality Disorders    | gen. pop: 5%-15%            | chronic pain: 51%-58%     |

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

Patients do not need to be mentally ill to have chronic pain.
Approaches to Resolve Negative Affect Influencing Chronic Pain

- Emotional Awareness and Expression Therapy (EAET)
- Pleasant Activity Scheduling
- Traditional Psychotherapy
Using Cognition to alter pain perceptions
Reframing

Perspective...
The Relaxation Response

- PMR
- YOGA
- Visual Imagery
- Meditation
- Biofeedback
Using Behavior to alter pain perceptions and provide a foundation of wellness
Multiple reviews and meta-analyses, and professional society guidelines recommend exercise and physical activity for the treatment of chronic pain and fatigue.

- Increase Fitness
- Increase Function
Lifestyle Physical Activity
Pacing for Energy Efficiency
Problem Solving / Goal Setting
Altering Pain via Sleep
Behavioral and Sleep Hygiene Skills

**Timing**
- Regular bed time/wake time

**Sleep Behavior**
- Get in bed only when sleepy
- Use bed for sleep
- Get up after 15’ if no sleep

**Thermal Tips**
- Decline in core temp signals sleep
- Exercise, warm bath before bed

**Ingestion**
- Decrease nicotine
- Decrease Caffeine
- Alcohol interferes with sleep
- Light snack is recommended

**Mental Control**
- Effort will not produce sleep
- Avoid mental stimulation
- Seek mental quiescence

Using the Environment to alter pain perceptions and provide a foundation of wellness
Social Challenges

Dr. -Patient

Friends

Family

Employer and co-workers
Physical Challenges
Web-based self-management

http://fibroguide.med.umich.edu/

Coming soon:
PAIN Guide
Persistent Pain Complaint

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### Pharmacological Therapies for Central Pain States

| Strong Evidence | ▪ Dual reuptake inhibitors such as  
|                 |   ▪ Tricyclic compounds (amitriptyline, cyclobenzaprine)  
|                 |   ▪ SNRIs and NSRIs (milnacipran, duloxetine, venlafaxine?)  
|                 |   ▪ Anticonvulsants (e.g., pregabalin, gabapentin)  |
| Modest Evidence | ▪ Tramadol  
|                 | ▪ Older less selective SSRIs  
|                 | ▪ Gamma hydroxybutyrate  
|                 | ▪ Low dose naltrexone  
|                 | ▪ Cannabinoids  |
| Weak Evidence   | ▪ Growth hormone, 5-hydroxytryptamine, tropisetron, S-adenosyl-L-methionine (SAMe)  |
| No Evidence     | ▪ Opioids, corticosteroids, nonsteroidal anti-inflammatory drugs, benzodiazepine and nonbenzodiazepine hypnotics, guanifenesin  |

## Non-Pharmacological Therapies for Chronic Pain States

### Strong Evidence
- Education
- Aerobic exercise
- Cognitive behavior therapy

### Modest Evidence
- Strength training
- Hypnotherapy, biofeedback, balneotherapy

### Weak Evidence
- Acupuncture, chiropractic, manual and massage therapy, electrotherapy, ultrasound

### No Evidence
- Tender (trigger) point injections, flexibility exercise
FibroGuide and Pain Guide can serve as the foundation for CBT
Bottom Line

1. Pain is not located in a body part. It is a perception and needs to be treated as a perception.

2. Taking time to just listen to the patient’s story is a necessary part of pain treatment. You will be treating the affective and social components of pain.

3. If you recommend self-management (exercise, relaxation, sleep hygiene etc.), ask about it with the same enthusiasm and regularity that you ask about drugs. Patients learn what you think is really important by what you ask about.