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>Cases</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
Pain Medicine Versus Pain Management: Ethical Dilemmas Created by Contemporary Medicine and Business

John D. Loeser, MD* † and Alex Cahana, MD, PhD* †

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>
</thead>
<tbody>
<tr>
<td>Long term opioids</td>
<td>32% reduction</td>
</tr>
<tr>
<td>Pain drugs generally (across classes)</td>
<td>30% - 40% get 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. average pain relief 18% across studies</td>
</tr>
</tbody>
</table>

Are Invasive Procedures Effective for Chronic Pain? A Systematic Review

Wayne B. Jonas, MD,* Gindy Crawford,† Luana Colloca, MD, PhD,‡ Levente Kriston, PhD,§ Klaus Linde, MD, PhD,¶ Bruce Moseley, MD,* and Karin Meissner**

*Integrative Health Programs, H&B Ventures, Alexandria, Virginia; †IU Foundation, Bloomington, Indiana; ‡University of Maryland School of Nursing and Medicine, Baltimore, Maryland, USA; ¶University Medical Center Hamburg-Eppendorf, Hamburg, Germany; §Institute of General Practice, Klinikum rechts der Isar, Technical University Munich, Munich, Germany; ‡Joseph Barnhart Department of Orthopedic Surgery, Baylor College of Medicine, Houston, Texas, USA; ¶Division Health Promotion, University of Applied Sciences Coburg, Coburg, Germany; **Institute of Medical Psychology, LMU Munich, Munich, Germany

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Conflicts of interest: All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare no financial relationships with any organizations that might have an interest in the submitted work in the previous three years and no other relationships or activities that could appear to have influenced the submitted work. The lead author attests that the manuscript is an honest, accurate, and transparent account of the study being reported, that no important aspects of the study have been omitted, and that any discrepancies from the study as planned have been explained.

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 analyzed study characteristics and assessed Cochran 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 (2,000 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 (62%) 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 = 0.08, 95% confidence interval CI = 0.01 to 0.09; P < 0.01, F 2 = 60%). In the two meta-analysis subsets, the standardized mean difference for reduction of low back pain in seven studies (N = 448) was 0.18 (95% CI = −0.14 to 0.51, P = 0.26, F 2 = 62%), and for knee pain in three studies (N = 416) it was 0.14 (95% CI = −0.11 to 0.01, P = 0.22, F 2 = 35%). 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 before invasive procedures are routinely used 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>
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</table>

**Newest Classification: Pain Mechanisms**

- Nociceptive
  - Peripheral damage or inflammation
- Neuropathic
- Central

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>
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<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

Adapted from Woolfe, CJ, Ann Intern Med. 2004;140:441-451
Mechanisms of Pain

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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

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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)
- Affect (emotional valence)
- Cognitive (evaluation and meaning)

Historical Biomedical Emphasis

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

Neurotransmitters for Pain Processing

**Norepinephrine**
- Concentration
- Circadian rhythms
- Attention
- Stress
- Energy
Neurotransmitters for Pain Processing

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**Serotonin**
- Well-being
- Sleep
- Affect /Mood
- Appetite
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Dopamine
- Attention
- Pleasure
- Reward
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Cognitive Function
Neurotransmitters for Pain Processing

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

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**GABA**
Major Inhibitor of CNS, Sleep/wake cycle

Neurotransmitters that majorly affect pain processing include:

- Glutamate: Major Exciter of CNS, Synaptogenesis and neurogenesis.
- Norepinephrine: Concentration, Circadian rhythms, Attention, Stress, Energy.
- Serotonin: Well-being, Sleep, Affect /Mood, Appetite.
- Dopamine: Attention, Pleasure, Reward.
- GABA: Major Inhibitor of CNS, Sleep/wake cycle.

These neurotransmitters play crucial roles in various physiological functions and can influence pain processing.
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

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

  ![Diagram](diagram.png)

  

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

  

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

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
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if insufficient effect

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Mixing in Pain Perception
Pain Care Pathway

Persistent Pain Complaint

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

Emotions
Reflections
Actions
Sleep
Environment

Sleep, Pain, Affect, Cognitive changes, Energy deficits
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>General Population:</td>
<td>6.6%</td>
<td>18.1%</td>
</tr>
<tr>
<td>Chronic Pain:</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
Reflections

Using Cognition to alter pain perceptions
Reframing
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
- Family
- Friends
- Employer and co-workers
Physical Challenges
Web-based self-management

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

Coming soon:
PAIN Guide
Pain Care Pathway

Persistent Pain Complaint

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### Pharmacological Therapies for Central Pain States

| Strong Evidence | Tricyclic compounds (amitriptyline, cyclobenzaprine) |
| Modest Evidence | SNRIs and NSRIs (milnacipran, duloxetine, venlafaxine?) |
| Modest Evidence | Anticonvulsants (e.g., pregabalin, gabapentin) |
| Modest Evidence | Tramadol |
| Modest Evidence | Older less selective SSRIs |
| Modest Evidence | Gamma hydroxybutyrate |
| Modest Evidence | Low dose naltrexone |
| Modest Evidence | 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

FibroGuide
An Online Self-Management Program for Individuals with Fibromyalgia

Facilitator’s Manual

David A Williams, Ph.D.
Professor, University of Michigan

Adapted from Living Well with Fibromyalgia

To be used with FibroGuide.com or FibroGuide.med.umich.edu

Pain Guide
An Online Self-Management Program for Individuals with Chronic Pain

Facilitator’s Manual

David A Williams, Ph.D.
Professor, University of Michigan
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.