Pain Management at a Crossroads: How We Got There & Solutions for Providing Safe and Comprehensive Care

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Disclosures

• Consulting: Salix, Scilex, Pfizer

Overview

• Challenges of “pain”
• Public health challenges
• State Initiatives Opioid Prescribing
• Federal Initiatives Opioid Prescribing & Pain Management
• CDC Guideline f
• HHS Interagency Task Force Report
• Patient-Centered Care
• Considerations Around Opioids
NHIS Estimates of Chronic Pain & High Impact Chronic Pain (HICP)\textsuperscript{1,2}:

- **Chronic Pain**: 50 million
  - Pain on most days or every day in past 6 months
- **High Impact Chronic Pain**: 20 million
  - Chronic pain limited life or work activities on most days or every day during the past 6 months
  - 91 million prescribed opioids, 2 million with OUD\textsuperscript{3,4}

### Patient-Centered Considerations

**“Pain”**
- Threat to the biological integrity of an individual

**“Suffering”**
- A threat to that person that is affecting who they are
  - Anxiety, depression
  - Distress, hopelessness
  - Change in function


### Pain Classification\textsuperscript{1}

- **Predominantly Neuropathic**
  - Postherpetic neuralgia
  - Painful diabetic peripheral neuropathy
  - Lumbar or cervical radiculopathy
  - Stenosis
  - Tumor-related neuropathy
  - Chemotherapy-induced neuropathy
  - Small fiber neuropathy
  - Persistent postoperative pain
  - Multiple sclerosis pain
  - Post-stroke pain
  - Pain associated with spinal cord injury

- **Predominantly Nociceptive**
  - Osteoarthritis
  - Rheumatoid arthritis
  - Tendonitis, bursitis
  - Ankylosing spondylitis
  - Gout
  - Neck and back pain with structural pathology
  - Tumor-related nociceptive pain
  - Sickle-cell disease
  - Inflammatory bowel disease

- **Predominantly Nociplastic**
  - Fibromyalgia
  - Irritable bowel syndrome
  - Tension-type pain
  - Interstitial cystitis/pelvic pain syndrome
  - Temporomandibular joint disorder
  - Chronic fatigue syndrome
  - Restless leg syndrome
  - Neck and back pain without structural pathology

Mixed pain conditions are frequently associated with multiple pain pathophysiologies and pain domains.

\textsuperscript{2} https://www.iasp-pain.org/PublicationsNews/NewsDetail.aspx?ItemNumber=6862


September 14, 2019
Structural and Functional Changes
THE BRAIN CHANGES!


Drugs Involved in U.S. Overdose Deaths 1999 to 2017

1st Wave
2nd Wave
3rd Wave
4th Wave: Pharmacovigilance and Pain Management Vacuum

Pharmacovigilance & Balanced Care
US Opioid Prescribing

- 2013-2018: opioid prescriptions decreased 33%
- Every state has seen a reduction
- 12.4% reduction between 2017-2018
- High dose prescribing decreased by 43%
- 2 million physicians registered for state-based PDMPs

Opioid Therapy: Current & Future State

<table>
<thead>
<tr>
<th>Non-Pharmacologic</th>
<th>Opioids</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT, OT</td>
<td>Behavioral Medicine</td>
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<tr>
<td>Behavioral Medicine</td>
<td>Interventional</td>
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<tr>
<td>Interventional</td>
<td>Non-opioid medications</td>
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<tr>
<td>Non-opioid medications</td>
<td>Complementary</td>
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<tr>
<td>Complementary</td>
<td>Education</td>
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<tr>
<td>Education</td>
<td>Mind-Body</td>
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</table>

Patient-Centered Approach

- *primum non nocere* – “Do no harm.”
- *deinde benefacere* – “Then, do some good.”
Best Practices for Opioid Prescribing

- Goals of reducing addiction rates
- Reduce burden to opioid treatment programs
- Excludes cancer, palliative, hospice, end of life, inpatient, provision of procedural medications
- Co-prescribing of benzodiazepines, barbiturates, carisoprodol, sedatives, and non-benzo hypnotics

Opioid Prescribing Treatment Plan

WAC 246-919-880; 885

Prescribing Limits without Documentation

- 7 Days
- 14 Days
- 14 Days

- Limits may be exceeded based upon written documentation in the clinical record.
- A lower amount than the stated limit may often be appropriate for less significant pain.
- ARNPs shall include the diagnosis or the ICD-10 code on all opioid prescriptions.
What about unused medications?

Hospital and Perioperative Opioid Management

- Common to overprescribe opioids after elective surgery or discharge from hospital
- Very small percentage of patients continue to use opioids after 90 days, regardless if “minor” or “major” surgery, 1
- Outpatient general surgery: 72% of opioids unused, 2
- Excess opioids stored in unsecure manner, great potential for abuse and diversion


Opioid Prescribing

- Rationale for any exceptions documented in medical record
- Initial prescriptions should not exceed 2 weeks
- Taper patients after 6 weeks or transition to subacute

\[ \begin{align*}
< 3 \text{ days} \\
< 7 \text{ days} \\
< 14 \text{ days}
\end{align*} \]
Simple Interventions to Decrease Overdoses and Adverse Events

Safe Disposal of Unused Medications

Take-back programs "Take back your meds.org"
- Disposal of unused medication
  - May vary by formulation (e.g., pills vs. patches)
- Household Trash
- Flushing

https://www.fda.gov/ForConsumers/ConsumerUpdates.

1. Mix medicines (do not crush) with unpalatable substances (kitty litter, coffee grounds)
2. Place in a container (plastic bag)
3. Throw in household trash
4. Scratch out personal information, then dispose container

Take-back programs "Takebackyourmeds.org"
- National Take-back Days
- Local programs

Legislative and Regulatory Update: Opioid Prescribing
FDA/ REMS Blueprint

- Sept 2013: FDA responds to citizen petitions, new class-wide safety labeling changes
- April 2014: FDA class-wide labeling changes for all ER/LA opioids
- May 2017: FDA post-marketing requirements for abuse-deterrent (AD) opioids
- June 2018: FDA labeling change letters, Opioid Analgesic Risk Evaluation and Mitigation Strategy (REMS)
- Sept 2018: FDA approves Opioid Analgesics REMS. Approved Blueprint, safety labelling changes, boxed warnings.
- May 2019: Safety Alert; CDC Perspective

CDC Guidelines for Prescribing Opioids for Chronic Pain

- CDC's recommendations are made on the basis of a systematic review of best available evidence.
- Clinical decision making should be based on a relationship between the clinician and patient, and an understanding of the patient's clinical situation, functioning, and life context.
- The recommendations in the guideline are voluntary, rather than prescriptive standards.
- Clinicians should consider the circumstances and unique needs of each patient when providing care.
September 14, 2019

**CDC Guideline for Prescribing Opioids for Chronic Pain**

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Evidence Category/Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nonpharmacologic therapy and non-opioid pharmacologic therapy are preferred for chronic pain. If opioids used, should be in combination with non-opioid pharmacologic therapy.</td>
<td>A, 2</td>
</tr>
<tr>
<td>5. Prescribe lowest effective dose. Use caution at any dosage. Carefully reassess benefits and risks when increasing &gt; 50 MME/day. Avoid increasing &gt; 90 MME/day or carefully justify a decision to increase &gt; 90 MME/day.</td>
<td>A, 3</td>
</tr>
<tr>
<td>6. Long-term, safe treatment of acute pain. Prescribe no greater quantity than needed for expected duration of pain. 3 days or less will often be sufficient.</td>
<td>A, 6</td>
</tr>
</tbody>
</table>

MMWR, CDC Guideline for Prescribing Opioids. March 15, 2016, Vol. 65. 1-50

Established patients already taking high dosages of opioids

- Tapering opioids can be especially challenging after years on high dosages because of physical and psychological dependence.
- Offer a nonjudgmental manner, “the opportunity to re-evaluate their continued use of opioids at high dosages in light of recent evidence regarding the association of opioid dosage and overdose risk.”
- Empathically review benefits and risks of continued high-dosage opioid therapy, and “offer to work with the patient to taper opioids to safer dosages.”
- “Very slow opioid tapers as well as pauses in the taper to allow gradual accommodation to lower opioid dosages.”
- Be aware that anxiety, depression, and opioid use disorder “might be unmasked by an opioid taper.”

Centers for Disease Control and Prevention MMWR March 15, 2016; 65 ew:3e108

**National Pain Strategy (NPS)**

**HEAL Initiative**

Helping to End Addiction Long Term

**SUPPORT (HR6):** Substance Use-Disorder Prevention that Promotes Opioid Recovery and Treatment for Patients & Communities
HHS Pain Management Interagency Task Force

- Mandated under CARA Act of 2016
- Chaired by Vanila Singh, MD, CMO, OASH
- Review clinical guidelines and identify gaps and inconsistencies for best practices in pain management
- Focus on unintended consequences of CDC guideline including patient abandonment, payer barriers, improving patient access to non-pharm, pharmacologic, interventional, and surgical treatment.
- HHS TF Draft Approved May 10, 2019
- National Academy of Medicine (NAM) with Aspen Institute

Recreational User

- High dose low function, psychosocial distress
- Low dose compliant, high risk
- Moderate dose, pain, & function stable
- Rewarding and anxiolytic properties of opioids

MED?

- 200
- 50
- 90
- 10
- 120
High doses. Is there an inflection point?

- "The current science of addiction and opioid prescribing doesn’t show a single inflection point where the risk of addiction dramatically escalates. There’s a risk of addiction at any dose or duration because addiction has roots not just in pharmacology and biology, but also a patient’s social, emotional, and medical history."

  - Scott Gottlieb, MD (Former Director, FDA)

Almost 4 out of every 5 patients who died from overdose/suicide were prescribed doses < 90 MEDD

Almost 3 out of every 4 overdose/suicide deaths were among patients with MH/SUD diagnoses

More than 1 out of every 2 deaths were among patients with MH/SUD diagnoses prescribed < 90 MEDD

Overdose/Suicide Mortality – VHA 2013

Courtesy of Friedhelm Sadnbruink, MD  Veterans Health Administration.

Recent Overdose Studies

- Vermont Medicaid system: long-term high dose opioids, ’12-’17
- 494 discontinued, median time to “0” MME: 1 day, 86% over 21 days
- 49% had opioid related adverse effects (ED visits, hospitalized)
- Speed of taper predicted adverse effects, and SUD Dx
- Kaiser Permanente CO study: opioid dose fluctuation associated with increased overdose risk
- 228 of 14,998 patients with opioid overdose: high dose variability (>17 MED) associated with overdose vs low dose

Irrational Exuberance

CDC Advises Against Misapplication of the Guideline for Prescribing Opioids for Chronic Pain (April 24, 2019)

- Misapplication of recommendations to populations outside of the Guideline’s scope.
- Misapplication of the Guideline’s dosage recommendation that results in hard limits or “cutting off” opioids.
- The Guideline does not support abrupt tapering or sudden discontinuation of opioids.
- Misapplication of the Guideline’s dosage recommendation to patients receiving or starting medication-assisted treatment for opioid use disorder.


Public Policy

- Is “policy” always rational?
- Can a complex problem by solved by policy?
- Who is making policy?
Policy Actors

1. Governmental
2. Framing Voices
3. Guidance & Metrics
4. Payors and Other Entities

American Pain Society Ceases Operation

- Board of Directors voted 11-1 for Chapter 7 bankruptcy
- Bankruptcy filing in Northern District of Illinois June 28, 2019
- Advocated for access to care and evidence-based treatment
- Educated primary care physicians and need to use nonpharmacological and opioid alternatives
- Awarded, recognized, and promoted hospitals and community-based health centers
- Support the careers of young pain scientists and clinicians
- The Journal of Pain
- Advocates for optimal models of care, professional & public education

Options for Balanced Care

- HHS Pain Management Task Force Report
- Opioid Therapy Selection
- Negative Affect
- Opioid Analgesia. What else?
- Ongoing Patient-Centered (PC) Assessment
Pain: Biopsychosocial Construct

Negative Affect
Negative Affect

- Correlates with increased pain intensity and poorer function with LBP patients
- Cancer postoperative pain: magnitude of negative affective symptoms correlated with higher opioid doses
- NA as a stronger predictor of opioid misuse vs pain level
- NA psychopathology predicts poor outcome in chronic LBP

1. Dworkin et al. 1986
2. Gatchel and Dersh, 2002.
3. Rapp 1996

Negative Affect and Diminished Opioid Analgesia & Increased Opioid Misuse

- Negative Affect: depression, anxiety, catastrophizing
- CLBP study: 6.5 month prospective study
- Treatment: opioid titration phase, 4 month continuation phase
- Results:
  - 25% dropout rate
  - High NA group: higher daily MED vs lower pain relief
  - High NA group: greater rate of opioid misuse (39% vs 8%), and greater opioid side effects


General Analgesia
- Decreased anxiety
- Respiratory depression
- Inhibition of central reflexes
- GI motility
- Cough suppression
- CRF, ACTH
- Miosis
- Pruritus, nausea, vomiting

Reinforcing Effects
- Reduce anxiety
- Decrease boredom
- Decrease aggression
- Increase self-esteem

Opioid Receptor Activity
Mood, Euphoria, Reward Continuum

Opioids MAY be part of a treatment plan, but not THE plan.

Putting It All Together

CDC Opioid Guideline

Determining need for opioids

- Opioids are not first-line or routine therapy for chronic pain.
- Establish and measure goals for pain and function.
- Discuss benefits and risks of opioid therapy and availability of nonopioid therapies.

Opioid selection, dosage, and duration of therapy

- Use immediate-release opioids when starting treatment.
- Start low and go slow.
- Reassess pain and function when doses reach >50 mg of morphine equivalents a day and avoid increasing doses to >90 mg a day without justification.
- Follow-up and re-evaluate risk of harm; reduce dose or taper and discontinue if needed.

Assessing risk and addressing harm

- Evaluate risk factors for opioid-related harms.
- Check PDMP for high dosages and prescriptions from other providers.
- Use urine drug testing to identify prescribed substances and undisclosed use.
- Avoid concurrent benzodiazepine and opioid prescribing.
- Arrange treatment for OUD if needed.

MAY
Identifying Patient Who Benefit from Chronic Opioid Therapy

- 63 yr. old, rheumatoid arthritis, lumbar spondylosis, s/p L3-sacrum fusion
- Chronic renal disease, COPD, chronic prednisone
- Retired "lumbar jack"
- Oxycodone 15 mg, 1 TID, MED: 60
- GAD-7, PHQ-9 elevated
- Physical Exam:

Don's Assessment

Determining need for opioids

- Opioids are not first-line or routine therapy for chronic pain.
- Establish and measure goals for pain and function.
- Discuss benefits and risks of opioid therapy and availability of nonopioid therapies.

- Patient-centered history
- Functional goals (3)
- Patient expectations
- Risk
Pain Navigator

- PEG
- MED
- Opioid Risk Tool (ORT)
- Urine Screen
- Treatment Agreements
- Risk Stratification Tool
- MED / ORT
- Adjust for Medical Comorbidities (1)
- Adjust for Medications at Greater Risk of Overdose (2)
- Final "Management Classification"
  - Low, Medium, High

Don’s: Opioid Risk Tool (ORT)

Mark each box that applies:

1. Family Hx of substance abuse
   - Alcohol
   - Illegal drugs
   - Prescription drugs

2. Personal Hx of substance abuse
   - Alcohol
   - Illegal drugs
   - Prescription drugs

3. Age between 16 & 45 yrs

4. Hx of preadolescent sexual abuse

5. Psychologic disease
   - ADD, OCD, bipolar, schizophrenia
   - Depression

Administer

- On initial visit
- Prior to opioid therapy

Scoring (RISK):

- 0-3: low
- 4-7: moderate
- ≥8: high
Assessment and Risk Stratify

- Medications:
  - Oxycodone 15 mg Q 4-5 hrs (60 MED)
  - Gabapentin 200 mg QHS
  - Amitriptyline 25 mg QHS
  - Robaxin 750 mg PRN
- Screening:
  - PHQ-9
  - GAD-7
  - Opioid Risk Tool: moderate
- Monitoring:
  - Urine monitoring
  - PMP: consistent w/prescribers

Ongoing Patient-Centered (PC) Assessment

- PEG
- Analgesic Response
- Mood
- Sleep
- Patient Goals & Expectations
- Daily Routine
- Compliance Monitoring

Pharmacovigilance & Balanced Care
Summary

- Public health challenges of opioid overdose and poorly managed chronic pain
- 3 "waves" of the opioid overdose epidemic
- Pharmacovigilance as a "4th wave"
- Prescription opioid use decreasing due to multiple factors
- Guidelines need to be interpreted appropriately, focus on patient-centered care
- HHS Interagency Pain Task Force supports multidisciplinary team-based approach
- High Impact Chronic (HIC) pain and patient-centered care
“Repent” =
Change your mind
Change your thinking

Thank you! steven.stanos@swedish.org
The Pain Psychology Imperative: Application of a National Model

Jennifer L. Murphy, PhD
CBT for Chronic Pain, Master Trainer, Veterans Affairs Central Office
Pain Psychology Program Manager, Tampa VA Medical Center
Assistant Professor, University of South Florida School of Medicine

Objectives

• Review role of emotional factors in pain experience and importance of biopsychosocial approach
• Discuss foundational components in behavioral pain medicine and model program in large healthcare system
• Identify ways that prescribers can positively impact engagement with behavioral pain medicine

Introduction

• VA's CBT for Chronic Pain Master Trainer and Manual Author
  • Have trained 600+ clinicians since program inception in 2012
  • Developed CBT-CP manuals for other healthcare systems and states on consulting basis
  • Involved in multiple funded trials re: CBT-CP, inside and outside VA
Public Health Crisis: Pain

Human and financial toll of pain

100 million = More Americans than diabetes, heart disease, and cancer combined

$635 billion annually

Public Health Crisis: Opioids

Public Health Crisis: Lack of Training

- Despite the extent of problem, those in medical and mental health fields receive little chronic pain training
- Significant shortage of those who understand both chronic pain and OUD
Public Health Crisis: Lack of Training

Pain and Mental Health

• Pain & mental health problems share common neural pathways & risk factors
• Bidirectional relationships affect treatment engagement & outcomes

Pain and Suicide Risk

• Pain is a risk factor for suicide
• Suicide rates are 2-4 times higher in pain population
• Higher opioid doses associated with suicide risk
• VA Behavioral Health Autopsy report (2015, 2017): The most frequently identified risk factor among Veterans who died by suicide was pain
Biopsychosocial: What We Know

- Pain is an unpleasant physical and emotional experience per IASP
- Pain impacts and is impacted by various factors
- Biggest predictor of pain outcomes is psychosocial factors

Biopsychosocial: What We See

- In theory, agreement that biopsychosocial is the gold standard approach to pain care
- In practice, the biomedical remains the prevailing force among providers and patients
- Behavioral medicine often introduced as “last resort” after all medical options have “failed”

Usual Care...

Lather, rinse, repeat
- More tests, more labs, more meds, more specialists
- Conclude that “physical” pain must not really be the problem...
- False dichotomy
Leads to Parallel Process

Common Ground

Provider Frustrations
- Unknown cause and/or diagnosis
- Numerous unsuccessful treatments – not getting any better
- I’m not sure I believe him/her – are they exaggerating?
- I want to help and it seems like there’s nothing I can do

Patient Frustrations
- Unknown cause and/or diagnosis
- Numerous unsuccessful treatments – not getting any better
- I’m not sure they believe me – I’m not exaggerating!
- I want help and it seems like there’s nothing they can do

Complex Presentations

Pain
Substance Use
Mental Health
Here to Help

- Bridge between prescribers and patients
- Time to listen and validate
- Expertise to explain and increase self-efficacy

Powerful Messenger

Prescribers key to changing narrative and beliefs

Unrealistic to expect patients to make behavioral changes without specific guidance

What are the outcomes you’d like to see? Let’s talk about how a pain psychologist can help you get there?

I can tell you WHAT you need to do –
They can tell you HOW to actually do it!

Bridge to Assist with Opioid Changes

Not responsible to take something away that is perceived as helpful without adding other useful tools to manage pain and distress

Strategies can assist with tapering directly

Data suggests that period following taper is also vulnerable, ideal for intervention (J Trafton, E Oliva, VA Office of Mental Health and Suicide Prevention)
Evidence-based Behavioral Medicine

- Cognitive Behavioral Therapy for Chronic Pain
- Acceptance and Commitment Therapy for Chronic Pain
- Meditation and Mindfulness-Based Stress Reduction

CBT-CP: First Line Treatment

- Guidelines
  - CDC
  - VA/DoD
  - NIH Pain Consortium

Most empirically supported and most commonly employed psychological intervention for chronic pain
Ideal Training Model

• Competency-based training program
• Required 2.5-day didactic
• 2 individual training cases
• Recorded digitally and reviewed/rated by subject matter experts
• Weekly consultation calls with feedback provided
• Certification and implementation for over 600 clinicians

VA CBT-CP Program Outcomes

• Initial analysis of first cohorts, 110 Veterans

Significant improvements in pain catastrophizing, pain interference, quality of life, and other domains, as well as on therapeutic alliance

VA CBT-CP Program Outcomes

• Currently under review
• Analysis of 1,491 Veterans through 2019
• Data collected at treatment initiation, middle, end

Measures of pain intensity, interference, catastrophizing, as well as depression and quality of life
VA CBT-CP Program Outcomes

Significant changes across pre-treatment, mid-treatment, and treatment conclusion on all outcomes and across time points

* Large effect size (Cohen's $d = 0.78$) for pain catastrophizing

* Medium-to-large effect sizes ($d > 0.60$) for worst pain intensity, pain interference, depression, and physical quality of life

Change in Pain Catastrophizing Over Time

Cohen's $d = 0.81$

Worst Pain of the Week

Cohen's $d = 0.60$
Pain-related Interference

Treatment Goals

Decrease negative impacts of pain and restore positive quality of life through whole person pain care

Reinforce self-efficacy and independence

Shift focus from zero pain to manageable pain, from what you can’t do to what you can do

Treatment Goal: Grow Your Life

Life gets BIGGER so pain feels SMALLER by comparison

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Language Matters

• This is not a “mental health” issue – behavior and mindset impacts the trajectory of illness
• Pain is real and is a multidimensional experience – cannot solve a complex problem with a simple solution
• Empowering: Chance to take back control
• Behavioral Medicine Prescription

Pain Education Basics

Biomedical vs Biopsychosocial

Acute versus chronic pain

Fear-avoidance, kinesiophobia

Chronic pain cycle

Goal Identification & Setting

• Identify motivations for treatment through identification of personal values

Sample questions to facilitate goal setting:

If pain weren’t calling the shots, what would you like to do?
If this treatment ‘worked,’ how would your life be different?
Self-Regulate Pain Response: Relaxation

- Increase self-regulation of physiological responses
- Change your stress response = calm you nervous system
- Quiet your harm alarm with relaxation response

Activation

- Movement is not only safe, it is helpful
- Importance of engaging in movement and exposure to feared stimuli (i.e., pain or re/injury) through activities
  Identification and involvement in pleasant activities
    Seek to increase meaningful activity, positive distraction

Time-Based Pacing

- Incorporated into all areas of functioning
- Focus on avoiding overactivity as well as underactivity
- Increase efficiency, improve physical state, decrease negative emotional consequences
The Role of Thoughts

• Negative thought patterns amplify pain processing in the brain and spinal cord
• Catastrophizing undermines pain treatment outcomes – fMRI show changes in brain
• Brain must be trained to develop more helpful patterns

Maintain Gains

• Minimize and make concrete plans for flare-ups
• Appropriate use of medications as one tool for management is often part of the conversation
• Use resources

Transform the Culture

• Focusing solely on biomedical aspects does not set patients up for success
• Introducing relevance of biopsychosocial factors to pain experience from the beginning is key for optimizing patient outcomes
• Refer to behavioral medicine and/or infuse principles into your own practice
This Hurt Is Real:
Exploring the endogenous opioid system in affect, reward, and chronic pain

O.V. Wright: This Hurt Is Real

- No Financial Disclosures
- I will present data about off-label medication use including Buprenorphine, Tramadol, and Naltrexone.
- I am not making any recommendations.

Acknowledgments
Learning Objectives

**Theory**
- Explore affective neuroscientist Jaak Panksepp’s “Seven Basic Affective Systems” emotional model.
- Propose that both affective and physical stimuli, as experienced in memory and language, may be expressed as pain and/or depression.
- Review the adaptive function of the endogenous opioid system.

**Practice**
- Understand the potent affective effects of exogenous opioids.
- Understand how chronic pain and mood disorders overlap.
- Identify clinical strategies to improve chronic pain, opioid use disorder, and affective disorders through the modulation of opioid systems.
- Focus on Buprenorphine, Tramadol, and Naloxone.

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Case

- 58 y/o man with past history of chronic low back pain and long-term opioid therapy.
- Injured back as contractor at age 46.
- Began opioids at age 47 with gradual dose escalation for next 6 years.
- Recently opioids have been tapered from ~180 MEDD to 135 MEDD.
- He has continued taking his previous dose, and supplemented with illicitly obtained opioids from a friend.
- He is admitted to internal medicine after an overdose.
- He denies any affective symptoms, only pain, “just hurts”, “I’m really suffering.”
- Further history reveals patient grew up with several siblings, joined military for 6 years where he learned mechanical skills, idealized father, learned discipline from mother who had to keep all the kids in shape.
- Could not describe hobbies, had poor libido, strained relationship with wife, isolated from previous friendships, had gained weight, rarely left the house due to pain. “You’d be depressed too if you hurt like this.”

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Affect

- What is affect?
- “Anticipatory neuropsychological mechanism” of the brain that promotes survival and reproduction.
- Emotional and Motivational.
- “Provide a flexible guide for living”.
- Innate and/or instinctual vs. Learned.

**Homeostatic Affects**
- Hunger, Thirst
- Temperature Regulation

**Sensory Affects**
- Pleasure of taste
- Comfort of gentle touch

**Emotional Affects**
- Fear
- Rage
- Joy
What properties determine a primary process (instinctual) affects/emotional systems?

1. Intrinsic inputs - Unconditioned stimulus (UCS)
2. Instinctual bodily and behavioral outputs - Unconditioned response (UCR)
3. Emotional systems, via reward and punishment, can facilitate and control the coordinated input of other stimuli into higher brain regions. This process can create conditioned stimuli (CS) or even complex ideas and ruminations occurring in frontal cortex.
4. Emotions outlast the stimuli that activate the system (whether UCS or CS)
5. Cognitive controls from higher brain regions can inhibit and activate emotions
6. Emotional systems can control and modify higher brain functions
7. All aspects of the system have the potential to modify and regulate the intensity, duration, and patterning of the emotional response
Seven Basic Affective Systems: *Primary Process*

- **SEEKING** (expectancy)
- **FEAR** (anxiety)
- **RAGE** (anger)
- **LUST** (sexual excitement)
- **CARE** (nurturance)
- **PANIC/GRIEF** (sadness)
- **PLAY** (social joy)

- These systems can be activated individually or concomitantly, and via higher MindBrain functions of cognition, such as memory and language, they form the phenotypic expressions of affective disorders.

**SEEKING**

- General behavioral activation and approach behavior
- “Wanting” - emotional control/salience mechanism/reward prediction
- Shifting between behavioral sets
- Anticipatory euphoria (The thrill of the hunt, anticipation of the meal, Not the not the satisfaction of the meal)
  - Dopaminergic, glutamatergic
  - Stimulated by cocaine, amphetamines
  - Electrically stimulated by Lateral Hypothalamus
  - Dynorphin deactivates this system
FEAR

- Inherent fear biologically encoded in our DNA to stimuli that consistently caused pain or forewarned danger
- Pain elicits fear in all mammals.
- Loud noises elicit fear in most mammals.
- Pain directly stimulates the PAG
- While pain always elicits fear, fear does not always elicit pain. In fact during fearful episodes, there is an increase in endogenous opioid release that can moderate pain.
- Catecholamines (epinephrine and norepinephrine), Corticotropin Releasing Factor, and Glutamate stimulate the fear response
- Serotonin and GABA decrease intensity of FEAR response (fearful behavior, not affect)
- NOTE - Anxiety related to FEAR is different from anxiety related to separation distress, which is mediated by the PANIC/GRIEF system

PANIC/GRIEF

“The dark side of our capacity for love and play”

- Core emotional system arising evolutionarily as the feeling of separation distress.
- More active in brain imaging than other emotions
- Brain systems that mediate the affective intensity of physical pain also mediate PANIC/GRIEF
- Effects of prolonged separation distress
- Relieved by social bonds, grooming behaviors, sense of security around those we love and trust
- Relieved by endogenous opioid release, exogenous opioid administration, also oxytocin and prolactin
- Modified by epigenetic changes with likely critical periods occurring during the first three years of life.
  - Right hemisphere
  - Orbitofrontal cortex

CARE

- Nurturing Love, “tend and befriend”
- Maternal
- May be evolved from LUST system
- Opposes PANIC/GRIEF
- Mediated by:
  - Oxytocin from anterior hypothalamus, mediated by estrogen and progesterone levels
  - Endogenous opioids, which may be enhanced by Oxytocin. Oxytocin decreases opiate tolerance.
  - BOTSA – Brain Opioid Theory of Social Attachment
  - VTA, VMH, BNST
  - The touch and sound of early maternal-infant bonding may be opioid mediated
Learning and Memory

● In Brief
  ● Learning and memory are largely involuntary responses mediated by unconscious mechanisms of the brain
  ● Long lasting memory are commonly linked to emotional arousal
  ● Evidence from study of fear-conditioning is robust and provides the best evidence for how pathologic emotional experiences persist, but also how they can be recontextualized
  ● Long term potentiation
  ● Reconsolidation

Pain and the Endogenous Opioid System (EOS)

Endorphins
  ● Neuropeptides
    ● Beta-endorphin
  ● Mu receptor mediated to produce desirable internal states
  ● Associated with pleasure, social bonding
  ● Dynorphin
    ● Kappa receptor mediated producing anhedonia, dysphoria
    ● Antagonistic to MOR system
    ● Associated with CRF release/stress response
  ● Enkephalin
    ● Mu, Kappa, Delta, ORL/Nociceptin

Endogenous Morphine
  ● Neurotransmitters
  ● Receptors
    ● Mu, Kappa, Delta, ORL/Nociceptin
• How do we define pain? The what vs. the why
  • Derived from Latin poena, meaning "penalty or punishment." (Oxford English Dictionary)
  • “the punishment or suffering thought to be endured by souls in hell”
  • “Physical or bodily suffering; a continuous, strongly unpleasant or agonizing sensation in the body”
  • IASP
  • “an unpleasant sensory and emotional experience associated with actual or potential tissue damage”

● Addiction vs. Complex Pain and Opioid Dependence (CPOD)

• Physical senses act as homeostatic mechanisms to urge specific behavior

● Discovery of endogenous opioid systems: what it has meant for the clinician's understanding of pain and its treatment
  ● Jane C. Ballantyne, MD and Mark. D. Sullivan

Sir William Osler
“Shunt the whole pharmacopoeia, except opium…What a comfort it has been!” (referring to himself)
“God’s own medicine”

“Among the remedies which it has pleased Almighty God to give to man to alleviate his suffering, none is so universal and so efficacious as opium.” – Thomas Sydenham


● The concept of pain perception, as distinct from nociception, being shaped by emotional learning and perceived danger, moves us closer to understanding pain as a motivational state that consciously or unconsciously drives behaviors.”

● Pain Matrix – a constellation of brain regions activated by nociceptive stimuli and non-nociceptive stimuli that threaten survival
...chronic pain is not so much a sensory problem as a reward problem...because pain experience exists within a broader context of hedonic homeostasis.

**Pain and Depression**
- **Pain:**
  - Negative
  - Acute pain signals danger from physical injury
  - Promotes withdrawal from painful stimulus, rest and recovery
  - Chronic Pain – Not just acute pain that has not gone away.

- **PANIC/GRIEF:**
  - Negative
  - Sadness thought of as a response to loss
  - Promotes social bonding
  - Chronic Sadness – i.e. clinical depression – not just sadness that has not gone away

**Therapeutic Implications**
- Ultra-Low-Dose Buprenorphine as a Time-Limited Treatment for Severe Suicidal Ideation: A Randomized Controlled Trial

- Opioid modulation with buprenorphine/samidorphan as adjunctive treatment for inadequate response to antidepressants: a randomized double-blind placebo-controlled trial.

- Safety, tolerability, and clinical effect of low-dose buprenorphine for treatment resistant depression in mid-life and older adults.

- Buprenorphine treatment of refractory depression.

- Depressive symptoms during buprenorphine treatment of opioid abusers.

- Antidepressant effects of buprenorphine.
### Therapeutic Implications

**Bücking et al. Use of tramadol in psychiatric care: a comprehensive review and report of two cases.** *Swiss Medical Weekly.* 2017; 147:w14428.

- 42 y/o man without psychiatric or substance use history developed vocational and relationship stress leading to presentation of insomnia, depression, and PTSD symptoms.
  - Tried Escitalopram, Quetiapine, Divalproex, Oxazepam and Hydroxyzine.
  - Had an incidental back injury, received Tramadol, noted improvement in mood.
  - Discussed with psychiatrist, then took Tramadol 15-35 mg up to 80 mg for no more than 3 days in a row with resolution of symptoms.
- 53 y/o woman with severe trauma, recurrent depression, intermittent alcohol use who had tried escitalopram, venlafaxine, mirtazapine, sertraline, fluoxetine, tramadol.
  - Took no more than 100 mg of Tramadol daily for six months, then tapered off over two months.
  - Abstained from alcohol.
  - Did relapse eventually.

### Therapeutic Implications

**Naltrexone (FDA approved for AUD, OUD in combination for obesity)**

- Is Fibromyalgia an Endocrine/Endorphin Deficit Disorder? Is Low Dose Naltrexone a New Treatment Option?
- Effects of Naltrexone on Pain Sensitivity and Mood in Fibromyalgia: No Evidence for Endogenous Opioid Pathophysiology
- Low-dose naltrexone for disease prevention and quality of life

- Serious adverse events reported in placebo randomized control trials of oral naltrexone: a systematic review and meta-analysis
  - 89 RCTs, 11,194 participants,
  - No serious adverse events of naltrexone compared to placebo.

### Therapeutic Implications

**Psychotherapeutic Approaches**

- The therapeutic alliance, i.e., affective quality of the therapeutic relationship, is strongest mediator of efficacy.
- Placebo.
Conclusions

- When prescribing opioids, whether for acute or chronic pain, the affect and motivational context of the individual is an important factor in treatment.
- It is likely that the experience of pain, fear and separation distress share common neurophysiologic circuitry.
- When prescribing any medication for any condition, the choice to do so should be based on careful consideration of risks and benefits.
- Long term exposure to exogenous opioids can lead to significant changes in neural mechanisms determining not only the experience of pain, but also attachment, SEEKING and CARE.

Thank you

References

- Ballenger, Jane C. The Brain on Opioids. Neuron. 2015 August 5; 87(3): 474–86. [http://dx.doi.org/10.1016/j.neuron.2015.06.033]
- Panksepp and Biven. From inflammation to sickness and depression: when the immune system subjugates the brain. 2016. Volume 159; 12. Plos Medicine. [http://dx.doi.org/10.1371/journal.pmed.1002140]
Therapeutic Cannabis in Louisiana

- 1978
  - First therapeutic cannabis bill adopted
  - Glaucoma and cancer chemotherapy
- 1991
  - Amended 1978 law
  - Added spastic quadriplegia

Both failed to create a regulatory framework for cultivation and dispensing; therefore, the program never progressed.

- 1994
  - DHH writes rules relative to therapeutic cannabis prescriptions

Therapeutic Cannabis in Louisiana

- 2015
  - Senator Fred Mills sponsored Senate Bill 143 (Alison Neustrom Act)
    - Comprehensive bill
    - Gave power to three state agencies to establish the framework for a legal Therapeutic Cannabis program
      - Louisiana Department of Ag and Forestry
      - Louisiana Board of Pharmacy
      - Louisiana State Board of Medical Examiners
    - Authorized 10 pharmacies and 1 cultivation site
Therapeutic Cannabis in Louisiana

• 2016
  • Amended 2015 Law
  • Changed "prescription" to "recommendation"
  • Changed 1 cultivation site to right of first refusal to LSU AgCenter and Southern AgCenter
  • Research component added
  • Sunsets on January 1, 2020

• 2018
  • Amended 2016 Law
  • Expanded qualifying conditions
  • Sunsets on January 1, 2025

Therapeutic Cannabis in Louisiana

• 2019
  • 14 bills filed
  • Five signed into law
  • Removed sales tax at patient level
  • Allowed metered-dose inhaler as a delivery mode
  • Removed requirement that physicians must be domiciled in Louisiana
  • Granted LSBME authority to collect patient information on health effects, events, and outcomes
  • Allowed for the cultivation, transportation, processing, manufacturing, and sale of industrial hemp and hemp-derived products (CBD)

Medical Conditions

• Cancer
• Positive status for Human Immunodeficiency Virus (HIV)
• Acquired Immune Deficiency Syndrome (AIDS)
• Cachexia or wasting syndrome
• Seizure disorders
• Epilepsy
• Spasticity
• Crohn’s disease
• Muscular dystrophy
• Multiple sclerosis
• Glaucoma
• Parkinson’s Disease
• Severe muscle spasms
• Intractable pain
• Post-traumatic stress disorder
• Autism-spectrum disorder
Allowable Delivery Methods

- No raw or smokable products
- Oils, extracts, tinctures or sprays
- Solid oral dosage forms, e.g., capsules or pills
- Liquid oral dosage forms, e.g., solutions or suspensions
- Edible dosage forms (chewable)
- Topical applications, oils or lotions
- Transdermal patches
- Suppositories
- Metered dose inhaler

Louisiana Department of Agriculture and Forestry

- Established and promulgated rules that govern production
  - Compliance and Inspections
    - Surveillance and security
  - Record keeping and recording
    - Louisiana Medical Marijuana Tracking System (LMMTS)
  - Testing
    - Active ingredient, pesticides, residual solvents, heavy metals, mycotoxins, microbiological

Louisiana Board of Pharmacy

- Established and promulgated rules which govern the distribution of product to approved patients
- Ten licenses
  - Divided state into 9 regions
  - 10th license reserved for high demand region
- Licenses awarded in April 2018; issuance after final inspection
### Louisiana State Board of Medical Examiners

- Established and promulgated the rules which govern physicians who wish to recommend Therapeutic Cannabis to their patients
- Physicians must submit fingerprints and complete a criminal background check through the state and the FBI, obtain a Schedule 1 authority for Therapeutic Marijuana from the LBOP, complete an online training program and receive a certificate of completion in order to recommend Therapeutic Cannabis to approved patients
- 141 physicians have applied (as of August 2019)

### LSU AgCenter Therapeutic Cannabis Program

- Operating under one of the two licenses in Louisiana
- Production
  - Public-Private Partnership with GB Sciences Louisiana, LLC.
- Research
  - Intellectual Property
  - Therapeutic Cannabis Research Committee (TCRC)

### “Seed” to sale Timeline

- Plant/Cultivate
- Harvest/Dry-Cure
- Extract Concentrate
- LDAF State Laboratory Analyze Concentrate
  - Active Ingredient (Potency), Pesticides, Residual Solvents, Heavy Metals, Mycotoxins
- Create Final Formulations
- LDAF State Laboratory Analyze Final Formulations
  - Microbiological Contaminants, Active Ingredient (Potency), Homogeneity
- Distribute to Pharmacies
Gb sciences Louisiana
Product release

• First Release: August 6, 2019

• Sublingual oil based tinctures
  • THC-Rich (Potency: 10mg THC/ml)
  • CBD-Rich (Potency: 40mg CBD/ml, 2mg
    THC/ml)
  • Balanced 1:1 (Potency: 5mg CBD/ml, 5mg
    THC/ml)

• Future products
  • Oral thin films
  • Medical lozenges/chews
  • Metered-dose inhalers

Research Opportunities

• Plant genetics
• Plant breeding/varietiy development
• Tissue culture propagation
• Cryopreservation of tissue
• Growth techniques
• Extraction techniques
• Compound identification
• Clinical Trials (LSUHSCs, Pennington BioMedical, LSU Vet School)

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Interventional Pain
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Integrated Pain and Neuroscience
Southern Pain Society Annual Meeting 2019
New Orleans, LA

About Me
- Residency in Anesthesiology
- Fellowship Pain Medicine
- Board Certified Anesthesiology and Pain Medicine
- Licensed Acupuncturist
- No Financial Conflicts to Disclose

Goals
- An Overview of the Role of IPM
- An Overview of the General Considerations of IPM
- An Overview of the Various Treatment Options
What is the Role of IPM?
Let’s take a quick look at some national guidelines.

Recent Relevant National Guidelines
- The CDC Guidelines 3/16
- Annals of Internal Medicine 2/17
- VA/DoD Clinical Practice Guidelines 9/17

CDC

Made 12 Recommendations For PCPs Treating Chronic Pain with Opioids
- 11 of 12 Recommendations from weak or very weak evidence

“Serious adverse events are rare but have been reported with epidural injection.”
For patients with chronic low back pain, ACP recommends that physicians and patients initially select non-drug therapy with exercise, multidisciplinary rehabilitation, acupuncture, mindfulness-based stress reduction, tai chi, yoga, classical mental training (Vipassana), meditation, eye movement desensitization and reprocessing (EMDR), biofeedback, operant therapy, cognitive behavioral therapy, or spinal manipulation.

The guideline does not address topical therapies or epidural injection therapies.

VA/DoD Guidelines for Low Back Pain

<table>
<thead>
<tr>
<th>Duration</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Term</td>
<td>For the long-term reduction of radicular low back pain, non-radicular low back pain, or spinal stenosis, we recommend against offering spinal epidural steroid injections.</td>
</tr>
<tr>
<td>Short Term</td>
<td>For the very short-term effect (less than or equal to two weeks) of reduction of radicular low back pain, we suggest offering epidural steroid injection.</td>
</tr>
<tr>
<td>Low Back Pain</td>
<td>For the treatment of low back pain, we suggest against offering intra-articular facet joint steroid injections.</td>
</tr>
<tr>
<td>Low Back Pain</td>
<td>For patients with low back pain, there is inconclusive evidence to recommend for or against medial branch blocks and radiofrequency ablation denervation.</td>
</tr>
</tbody>
</table>

Where does IPM fit in...
General Considerations

- Do no harm
- Can the procedure be performed with reasonable safety
- Do the benefits outweigh the risks?
- Consent
- Alternatives

So what are we doing anyway

- Diagnosing: often in partnership with referring physicians
- Avoiding and or limiting the role of medications
- Enabling increased function, exercise, participation in physical therapy or exercise
- Decreasing pain due to inflammation
- Interrupting transmission of pain sensations
- Neuromodulation

So what are we doing with these needles

- Releasing tension in muscles or trigger points
- Injections steroids for inflammation
- Testing position with electrical stimulation
- Creating lesions with electrical stimulation
- Sensing messages across the blood brain barrier
- Neuromodulation across the blood brain barrier
Acupuncture

• In my opinion, nothing comes close to acupuncture in terms of
  • Cost
  • Side Effects
  • Complications
  • For many, the effectiveness

Brief Historical Context

• The first major text we have dates to Han Dynasty about the BC-AC transition
• Majority of US physicians from this tree
Acupuncture includes:

- Placing needles in discrete acupuncture points.
- Placing needles in areas of local problems or the spinal segment of the affected area
- Cupping
- Ear and scalp acupuncture
- Gua Sha - scraping.

Tai Yang Shao Yin Energy Subcircuit

- Consists of the Small Intestine, Bladder, Heart and Kidney Meridians
- Contains Points, channels thought to be particularly important for overall energy and structure, as well as pain.
Cupping

• Placing glass or plastic cups in a problem area, evacuating the air to create suction.
• This pulls the skin and underlying tissue partially into the cup.

Common Treatments

► Most of my common pain treatments use a combination of:
  ► Traditional points on the relevant meridians
  ► Soft tissue points or tender points
  ► Periosteal Points- tip placed just into bone periosteum

* International Classification of Headache Disorders 3rd Edition from 2013
The Primary Headache Syndromes

1. Migraines
2. Tension Type Headaches
3. Trigeminal Autonomic Cephalgias
   - Including Cluster
4. Other such as cough, exercise, sex-related.

The Secondary Headache Syndromes

- Primarily those attributed to trauma, vascular disorders, infection, etc.
- Also would include headaches attributed to cervical problems, e.g. cervicogenic headaches, facetogenic headaches.
- Also would include medication overuse headaches

Part 3 - painful cranial neuropathies

1. TGN
2. Occipital neuralgia
3. Optic Neuritis
4. Others
The Role of Interventional Headache

• Generally not first line
• Acute Zoster, Acute TGN possibly exceptions
• For migraines, other headache syndromes, patients should be evaluated and maximized medically and these interventions reserved for the more recalcitrant conditions

Trigeminal Neuralgia

A unilateral disorder characterized by brief, electric shock-like pain, abrupt in onset and termination, limited to the distribution of one or more divisions of the trigeminal nerve.

Allodynia - Pain commonly evoked by trivial stimuli such as light touch, brushing teeth, talking, shaving.

Symptoms remit for variable periods

Trigeminal Neuralgia Treatment Algorithm

• Above symptoms
• MRI - the differential is about 20 conditions
• R/o symptomatic or secondary TGN (tumor, etc.)
• Pharmacologic Management, Acupuncture, etc.
• Young patient with evidence of vascular decompression
• Surgical referral for microvascular decompression
• Elderly patient or no evidence for vascular decompression
• Gamma Knife or interventional techniques including block and radiofrequency ablation.
Gasserian Block

- 51 year old female with chronic intractable frontal migraine headaches
- Referred by neurologist for block
- Patient Pain Free in Recovery
- Longterm response?
- If short-term but positive response, consider pulsed RF.

Chronic Migraine Treatment

- Medication ineffective or causing side effects
- Rule out Medication Overuse Headache
- Botox
- IV Infusions
- Look for targets, largely based on the primary headache location or presence of autonomic features.
  - Occipital Nerve Block
  - Peripheral Trigeminal blocks, e.g. supraorbital
  - Sphenopalatine Ganglion Block, V2, V1 if indicated by distribution
  - Especially with autonomic features - stellate ganglion block

Occipital Nerve Block

- Blindly
- Often sufficient
- Ultrasound Guided
- Potentially more therapeutic
- Fluoroscopically Guided

- For modulation of migraine
- For diagnosis and treatment of true occipital neuralgia
Case Report

- 58 year old female
- 26 months of posterior headaches after trauma, had lumbar and cervical complaints initially.
- Lumbar problems resolved with ESIs.
- Cervical ACDF was performed which mostly resolved cervical complaints.
- Occipital Headaches, slightly greater right than left
- Occiput to the crown, occasionally farther forward.
- Constant moderate to severe pain
- Allodynia
  - Putting on clothing hurts
  - Can't get a haircut
  - Can't tolerate ACP
  - Debilitating when flared.

Perform blindly
- 1 month follow up
- Brief Flare at injection site
- At 1 week symptoms resolved entirely for 2 weeks
- At 1 month, only intermittent symptoms, about 80% relief.
- This was in July, haven’t heard anything further.

Sphenopalatine Ganglion

- A parasympathetic ganglion found in the pterygopalatine fossa.
- Largely innervated by the greater petrosa nerve, a branch of the facial nerve.
- Useful target for chronic headache syndromes.
Sphenopalatine Ganglion Block

- Chronic Headaches
- V2 Trigeminal Neuralgia
- Pulsed RF is a great option

Spine Common Targets

- Anterior
  - Annular tears
  - Epidural Inflammation
  - Nerve root Inflammation
- Posterior
  - Facet/other joint pain

Spine General Considerations

- MRIs don’t always correlate with clinical findings.
- MRI is a part of the puzzle
- However the dominant lesion on MRI disc and times is not necessarily the dominant pain generator.
  - E.g. severe spinal stenosis but the pain generator is facet syndrome.
Degeneration and the spinal segment

- Normal disc accepts forces and distributes them evenly to the endplates and the AF
- With disc height loss, more force is applied to the posterior annulus and to the facet joints.
- With height loss, there may be laxity of ligaments, which predisposes to instability and muscle spasm.

Cervical Facet Patterns

- Upper cervical facets as well as the AO and AA joints may mimic occipital neuralgia and are included in the differential.

Cervical Joints and Cervicogenic Headaches

- Atlanto-occipital joints- rarely used in my practice.
- Atlantoaxial joints
  - up to 10-20% of occipital headaches after whiplash
- C2/3 Facet Joints
  - 20-30% of headaches after whiplash injury
- C3/4, C4/5
- Soft tissues
• AP View
• Atlanto-axial joint Injection
• The Atlanto-occipital joints are outlined in red

Cervical Facet Block Contralateral

► 45 degree contralateral view allows better confirmation of intra-articular spread C2/3

Superion Implant

► Percutaneous
► Minimally Invasive
► Great for older patients who are poor candidates for open decompression
Sacroiliac Joints

Sacroiliitis

- intra-articular injections
- peri-articular infiltrations
- radiofrequency (RF) ablation.

Fortin’s finger test:

The patient can consistently indicate the location of the pain with 1 finger infero-medially to the posterior superior iliac spine.
Knee, shoulder, and hip pain

- Overall, 46% of patients reported persistent pain at the surgical site - 53% after TKR and 38% after THR

Genicular Nerve Block and Ablation

- A network of femoral, common peroneal, saphenous, tibial, and obturator nerves. Each type of nerve is the relay for pain signals that originate in a different area of your knee. These nerves are broadly known as genicular nerves.
- A genicular nerve block uses anesthetic injected into one or more of the genicular nerves, typically into one of three branches: the superior medial, the superior lateral, and the interior medial genicular nerves. I often do the inferior lateral branch.

Genicular Ganglion Block

Block of the superior and lateral inferior branches
SCS

- A great option for persistent radicular pain, neuropathic pain
- Overused for LBP, hit or miss
- Evolving
- Several mechanisms thought to be at play

AP

- AP view with on lead positioned midline T7-10
- Attempting to thread a second lead but having some difficulty

Lateral View

- Lateral view showing the second lead heading anteriorly. Not ideal needle approach, reposition for a more shallow approach to the epidural space.
Midline Single Lead

Ultimately unable to thread a second lead, performed trial with a single midline lead. Patient reported 60% overall relief and desired to proceed with full implant.

Beyond Stim

> Ladies and Gentleman, welcome to flavor country!

> Not uncommon to place a pain pump in a patient with pre-existing SCS
Case Report

- 49y/o female with chronic flank pain due to kidney disease
- ITDD for roughly 10 years
- Noted on gradual decrease in therapy, some potential withdrawal symptoms.
- Brought in for dye study
- Catheter access, withdrew 6 mls of a very thick, brownish fluid clearly abnormal

- Sent to ED for evaluation
- Neuro repeated catheter aspiration, withdrew 2 ml of same, with a hard stop
- Cultures negative

The End!
Thank you for your attention
New Concepts in the Treatment of Orthopedic Conditions:
The Role of Orthobiologics:
Platelet-Rich Plasma (PRP)
and
Stem Cell Therapies
Southern Pain Society Annual Meeting
September 14th, 2019
R. Amadeus Mason, MD, CAQSM, RMSK
Assistant Professor of Orthopaedics and Family Medicine
Emory University School of Medicine
Emory Sports Medicine Center

Disclosures
• I, R. Amadeus Mason MD, nor any immediate family members, have no relevant financial or nonfinancial relationship(s) within the products or services described, reviewed, evaluated or compared in this presentation.

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Drs. Ken Maunter, Robert Bowers
and
Chris Williams
Objectives

- Define Orthobiologics
  - Understand the different Orthobiologic options
- Discuss Rationale for use
- Discuss Application in Orthopaedics
  - What’s in the literature
  - General considerations
  - What we do at Emory

Amniotic Tissue
Embryonic Tissue
Placental Tissue
Umbilical Cord Tissue
Adipose Tissue
Mesenchymal Stem Cells (MSCs)
Bone Marrow
Bone Marrow-derived Cells
Scaffold
Orthobiologics

- The use of biological substances to help MSK tissue heal more quickly.
- Biological substances
  - Naturally occurring in the body
  - Normally associated with healing
- MSK tissue
  - Muscle
  - Tendon
  - Ligament
  - Bone

What is all of this stuff?
Platelet Rich Plasma (PRP)
- Autologous blood
- Concentrated above baseline
- Usually 4-5 times baseline (1.5–4.5 x 10^5 uL)
  - PRP – platelet rich plasma
  - PRC – platelet rich concentrate
  - PRG – platelet rich gel
  - ACP – autologous conditioned plasma
  - A2M – α-2 Macroglobulin
- Use variable speed centrifuge

Platelet Rich Plasma (PRP)
- Characterization
  - Leukocyte rich vs Leukocyte poor
  - Decreased pain
  - Decreased inflammation
  - No increase infection
- Low RBC
  - Intra-articular administration
- Dragoo, et al. AJSM (2012)
- Decreased pain
- Decreased inflammation
- No increase infection
- Braun, et al. AJSM (2014)
Platelet Rich Plasma (PRP)

- Classification system: Mishra et al (2012)
  - 4 types
  - Based on:
    - WBC's
    - Platelet activation
    - Platelet Concentration

Types of Injectable MSC’s for Cartilage/OA

- Autologous
  - Bone Marrow
    - BMN (Bone marrow aspirate)
    - BMC (Bone marrow concentrate)
  - Adipose Derived Stem Cells
    - Liposuction
    - SVF (Stromal Vascular Fraction)
    - Culture/expanded

- Allogenic
  - Placental Derived Cells
  - Umbilical Cord Blood/Tissue

Bone Marrow Nucleated Cell Isolation

The stem cell fraction of bone marrow is isolated via a centrifuge and re-injected the same day.

Bone Marrow Mesenchymal Stem Cell Culture

The stem cells themselves are isolated and cultured to greater numbers over a few weeks. This produces a “pure” population of stem cells which is different than the mix of cells produced by same day procedures.

Simple Adipose Graft

The fat is separated from the oil and liquid and the fat is injected (however the stem cells are still trapped in the fat and are not concentrated).

Stromal Vascular Fraction (SVF)

The fat is separated and then chemically digested to release the stem cell fraction, which is then concentrated.

Adipose Mesenchymal Stem Cell Culture

The stem cells are isolated and cultured to greater numbers over a few weeks. This produces a “pure” population of stem cells which is different than the mix of cells produced by same day procedures.

Three Different Types of Fat Stem Cell Processes

Same Day

Same Day

A d v a n c e d

A d v a n c e d

Drug Needs FDA Approval

Drug Needs FDA Approval

Drug Needs FDA Approval

Tissue

No FDA Approval

Tissue

No FDA Approval

Tissue

No FDA Approval
Sources of Birth Tissue Injectables

**Rational for Use**

- **In Bone**
  - Can regenerate
  - Direct blood supply
  - Areas with decline
  - Naturally occurring
  - Due to trauma

- **In Muscle**
  - Has good blood supply
  - Cannot regenerate after injury

- **In Tendon, Ligament**
  - Premature blood supply

**Rational for Use**

- **Acute vs Chronic**
  - Chronic usually more problematic
  - Overuse
  - Repeated micro-traumatic events
  - Disruption of the internal structure
  - Degeneration of the cell and matrix
  - Mismatch of injury and healing response
  - Augmented delivery of appropriate substance
    - PRP/BTI – growth factors
    - MSC – bone cells
MSK Applications

Lateral Epicondylitis

  - RCT, 100 patients
  - Significantly better than steroid at 12 months
    - Even after 3 years follow-up
  - Series vs single injection
    - Based on severity
    - MRI vs MSK US
  - Rehab protocol
    - Immobilization
    - Progressive strengthening
    - Pain control

Rotator Cuff Tears

- Partial vs complete
  - Used intraoperatively, Randelli, et al JSES (2011)
  - 14 patients
  - Improves VAS and UCLA shoulder scores
- Use after failing conservative treatment
  - Single injection
  - Rehabilitation Protocol
    - Early mobilization
    - Good pain control
    - Consider Adipocyte Stem cell
    - Full thickness tears (small)
    - Provides scaffold
Achilles Tendinopathy

- Partial tear/chronic tendinopathy
- 65 patients
- No clinical superiority found
- Series vs single injection
  - Based on severity
  - MRI vs MSK US
- Rehab protocol
  - Immobilization
  - Progressive strengthening
  - Pain control

Patellar/Quad Tendinopathy

- After failed conservative treatment
  - Refractory, chronic patellar tendinopathy
  - Promoted satisfactory clinical outcome
- Series vs single injection
  - Based on severity
  - MRI vs MSK US
- Rehab protocol
  - Immobilization
  - Progressive strengthening
  - Pain control

Sports Hernia

- Have to make diagnosis
  - MSK US can be helpful
  - MRI with "athletic pubalgia" protocol
- "Single" injection
  - Adductor insertion
  - Rectus insertion
  - Pubic symphysis?
  - CSI
- Formal rehab protocol
Osteoarthritis

  - RCT, 120 patients
  - Out performed HA
  - PRP vs Stem cell
  - PRP following HA series
  - Bone Marrow vs Adipose

MSC Literature Review

  - Bone Marrow-Derived and Adipose-Derived Mesenchymal Stem Cell Therapy in Primary Knee Osteoarthritis: A Narrative Review
  - 14 studies
  - 3 RCTs
  - Bone Marrow: 6 studies
  - Adipose Tissue: 8 studies
  - Culture Expanded: 7 studies

- J. Jayaram P, Ahoama u Rothenberg, JB Malanga GA

Summary

- Results: all 14 studies
  - No major adverse events
  - Improved pain and function
  - Only 1 study with "negative" results
Knee OA Epidemic

- 18 million Americans currently living with symptomatic knee OA.
- 4.1 million Americans
  - Difficulty with ambulation having failed conservative treatment.
  - Candidates for knee arthroplasty or high tibial osteotomy (HTO).
- 500,000 Americans
  - Knee arthroplasties and HTOs are performed annually in the United States.
- 1.6 million Americans
  - "Stuck" in a treatment gap.
  - Unwilling or not a candidate to undergo arthroplasty/HTO.
  - Remain in "gap" for an average of 20 years.

Knee OA Treatment Gap

- Particularly important in the younger population
  - Potential risk of revision surgery.
  - 38.3% of OA patients are under 55.
  - 10.5% of patients are under 35.

This highlights the necessity for the development of safe, effective, minimally invasive, treatments that provide favorable efficacy and safety profiles.

BMJ Open

Knee arthroscopy versus conservative management in patients with degenerative knee disease: a systematic review.

Conclusion: Over the long term, patients with knees undergoing arthroscopy versus those receiving conservative management strategies do not have improved balance or pain of function.
FDA Drug Safety Communication: FDA strengthens warning that non-aspirin nonsteroidal anti-inflammatory drugs (NSAIDs) can cause heart attacks or strokes

- Based on our comprehensive review of new safety information, we are requiring updates to the drug labels of all prescription NSAIDs.

- The risk of heart attack and stroke with NSAIDs, either of which can lead to death, was first described in 2005 in the Boxed Warning and Warnings and Precautions sections of the prescription drug labels.

- The risk of heart attack or stroke can occur as early as the first weeks of using an NSAID. The risk may increase with longer use of the NSAID.

- NSAIDs can increase the risk of heart attack or stroke in patients with or without heart disease or risk factors for heart disease.

- Patients treated with NSAIDs following a first heart attack were more likely to die in the first year after the heart attack compared to patients who were not treated with NSAIDs.

The Effect of Intra-articular Corticosteroids on Articular Cartilage

- Methylprednisolone, dexamethasone, prednisolone, hydrocortisone, and triamcinolone were reported to display dose-dependent deleterious effects on cartilage morphology, histology, and viability in both in vitro and in vivo models.


- The Effect of Intra-articular Corticosteroids on Articular Cartilage: A Systematic Review; Chloe Wernecke, Hillary J. Braun, and Jason L. Dragoo, The Orthopaedic Journal of Sports Medicine, 3(5), 2325967115581163
**Anesthetic agents are also a concern...**


- A total of 3012 procedures were performed on 2372 patients with follow-up period of 2.2 years.
- 325 adverse events were reported.
- The majority were pain post procedure (n=93, 3.9% of the study population) and pain due to progressive degenerative joint disease (n=90, 3.8% of the study population).

- Our findings are consistent with prior investigations demonstrating a favorable safety profile for the percutaneous use of BMC and MSC injections for the treatment of orthopaedic conditions.

---

**Methods:**

- Cross-sectional electronic survey of current members of the British Elbow and Shoulder Society (BESS) and the British Society for Surgery of the Hand (BSSH).
- 48% use corticosteroid injections as their first-line treatment for tennis elbow.
- 77% believed that corticosteroid injections are not potentially harmful in the treatment of tennis elbow.
- 11% did not use them in their current practice.

- In light of recent evidence of the potential harmful effects of corticosteroid therapy, 50% had not changed their practice while 40.1% had reduced or discontinued their use.

**Conclusions:** Recent high-quality evidence that corticosteroids delay recovery in tennis elbow appears to have had a limited effect on current practice...
Why American doctors keep doing expensive procedures that don't work

The proportion of medical procedures unsupported by evidence may be nearly half.

The alarming news about absent care in a landmark study published in November, in The Lancet. It found that patients who got a 50 percent or less chance of recovery from non-malignant pathologies were twice as likely to continue without the benefit of a second opinion. The Lancet.

• Many procedures continuing to be done despite negative data.
• What are the ethical issues here?
• We are all trying to help our patients.

Where are we headed?.....The Good
Where are we headed?.....The BAD!

Despite FDA crackdown, stem cell therapy still "wild west"

Where are we headed?.....The UGLY!

B-2018

- 71 year old gentleman with LBP, Neck Pain, Left shoulder pain
- Ongoing with worsening over the past several weeks, especially in his left shoulder
- Interested in "stem cells" for his pain
- Went to "stem cell clinic" and had no advanced imaging done
- Treated with umbilical "stem cells"
  - 6 facets in neck
  - 4 facets in lower back done under fluoros (ordered by chiro)
  - 3 "spots" in left shoulder injected with NO guidance
- PAID $20,000 for these injections
- Comes to see me 3-4 weeks later with no resolution of pain

Where we are headed

Randomized multicenter trial comparing the efficacy of mesenchymal stem cell preparations from autologous, bone marrow concentrate (BMAC), adipose stem cell stromal vascular fraction (SVF), to allogeneic mesenchymal stem cells from umbilical cord tissue for the treatment of unilateral osteoarthritis (OA)

Multicenter trial of stem cell therapy for osteoarthritis

In partnership with The Marcum Foundation
September 14, 2019

Study Design

- Compare multiple types of MSC injections head to head in a single-blind, randomized, controlled trial for unilateral knee osteoarthritis
  - 480 patients – 160 patients per arm
  - All patients cross over to the other MSC type after 1 year

Key Outcomes:
- Knee function improvement
- Pain reduction
- MRI cartilage assessment

Study Design

- MSC Characterization of each type of tissue
  - TNC, Flow Cytometry, CFU counts, Proteomics
- Characterize the synovial environment
  - Pre-treatment and at follow-up
- MRI with cartilage mapping
  - Pre-treatment, 6 months, and 12 months
- Patient Reported Outcomes (PRO's) at 1, 3, 6, 9, 12 months
  - WOMAC, VAS, eQOL
- Longer term follow-up planned

Take Home Points

- Musculoskeletal conditions represent a large burden on our healthcare system
- Many commonly used treatments demonstrate questionable benefit and can harm patients
- Orthobiologic treatments including PRP and Stem cell therapies have increasing evidence of efficacy for a variety of musculoskeletal conditions
  - Orthobiologic therapy in orthopedics demonstrated to be safe
  - Strict characterization of the PRP/Cellular content needs to be investigated
  - Bone marrow aspiration has the longest and greatest evidence of efficacy
  - There is increasing evidence for the use of ADSC's
  - Birth Tissue Products do NOT contain live tissue
Be Aware of all the options available \textbf{NOT} just the one's that you know to perform

- Avoid treatments that are \textbf{KNOWN} to be harmful.
- Be aware of the \textbf{evidence} of the treatments offered.
- Be aware of your patient's preferences!
- Keep up with scientific literature on the evolving area of Orthobiologics (PRP, stem cell, etc) and how they may apply to various orthopedic conditions

\textbf{References}


Functional Restoration: Applying a Biopsychosocial Model Across the Continuum of Care

Steven Stanos, DO
Medical Director, Swedish Health System
Pain Medicine & Services
Swedish Pain Services
Seattle, WA
Past President, American Academy of Pain Medicine
September 14, 2019

Disclosures

• Consulting: Scilex, Salix, Pfizer

Overview

• Federal and State Initiatives
• HHS Interagency Task Force
• Multidisciplinary and Interdisciplinary Models
• Components of team based care
• Integrating Multiple “Disciplines”
• Barriers for Integration
### Table

<table>
<thead>
<tr>
<th>Misuse, Addiction</th>
<th>Diversion, Overdose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior Authorizations</td>
<td>Prescribing Metrics</td>
</tr>
<tr>
<td>Quality Metrics</td>
<td></td>
</tr>
</tbody>
</table>

### Diagram

- **Efficacy of Interventions**
- **Time**
- **Patient Factors**
- **Patient Expectations**

What's causing “the pain”?

---

**HHS Pain Management Interagency Task Force**

[Link](https://www.hhs.gov/about/the-secretary/2018-12draft-report-on-updates-gaps-inconsistencies-recommendations/index.html)
HHS Task Force Key Concepts

- Balanced pain management
- Individualized
- Multidisciplinary
- Multi-modal approach
- Perioperative home and acute pain guidelines
- Addressing drug shortages
- Access to care
- Stigma as a barrier to treatment
- Education
- Innovative solutions
- Research
- Special Populations

Pain: Biopsychosocial Construct

Why multidisciplinary?

**CDC Guideline Prescribing Opioids for Chronic Pain**

<table>
<thead>
<tr>
<th>#</th>
<th>Recommendation</th>
<th>Evidence Category/Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nonpharmacologic therapy and nonopioid pharmacologic therapy are preferred for chronic pain. If opioids used, should be in combination with non-opioid pharmacologic therapy.</td>
<td>A, 3</td>
</tr>
<tr>
<td>2</td>
<td>Establish treatment goals. Continue only if there is clinically meaningful improvement in pain and function that outweighs risks to patient safety.</td>
<td>A, 4</td>
</tr>
<tr>
<td>3</td>
<td>Discuss with patients known risks and realistic benefits of opioid therapy and responsibilities of patient and clinician.</td>
<td>A, 3</td>
</tr>
</tbody>
</table>


**BioPsychoSocial Model**

- Pain behaviours
- Pain
- Suffering
- Psychosocial factors
- Nociceptive pathways
- Tissue factors
- Endogenous opioids
Gate Control Theory

A. Sensory
B. Affective
C. Evaluative

John Melzack, PhD
Patrick Wall, PhD

Chronic Pain: Bio-Psycho-Social Model

Jane
Pain 8/10
MED: 0

Bryan
Pain 8/10
MED: 0

Body Self Neuromatrix

INPUTS
Cognitive
Evaluative
Tissue
Sensory
Discriminative
Motivational-Affective

OUTPUTS
Pain Perception
Action Programs
Stress-Regulation Programs

Time
Melzack R. J Dent Education 2001 Jun;65:1379-82
People don’t change behavior because they . . .

- Do not think they can
- Are not ready for it
- Their values don’t support it
- Do not think it is important
- Do not believe it is needed
- Do not have adequate support
Is the patient ready for change?

- Shift away from biomedical model to one based on partnering and engaging the patient
- Provider needs to change and adapt
- Understand patient’s perspective
- Educate and correct irrational and uneducated assumptions
- Shift patients as the “true” change agent
- Incorporate therapies that help to alter or reverse their dysfunctional response to pain

**Pain Management Models**

- Parallel Practice
- Coordinated
- Interdisciplinary
  - Models
  - Collaborative
  - Multidisciplinary
  - Integrative
- Risk Stratification, Education, Engagement
- Acute
- Chronic Pain
- High Impact CP
- Philosophy & Integration

- Biomedical
- Biopsychosocial

**Integrating Team Models**

- Collaborative Care: Focus
- Patient Identification & Population Management
- Care Team
- Care Management
- Evidence-Informed Care
- Patient Supported Self-Management
A Biopsychosocial Continuum

• 1. Primary Care
  • Collaborative Care
  • Integrated Behavioral Medicine

• 2. Multidisciplinary Care: Pain Management
  Interventional Therapies  Addiction Medicine (MAT)
  • Medication Management  Acupuncture

• 3. Rehabilitation Services
  • Physical and Occupational Therapy
  • Functional Restoration / Interdisciplinary Care

Pain Treatment: Modulating Pain Systems

• Group CBT produced increased gray matter volume and density correlating with patient’s recovery.

• Chronic low back pain treatment: Increased cortical thickness in left DLPFC, and correlated with reduction in pain and disability.


Stepped Care Model: VA-DoD

1. Sandbrink Friedhelm, M.D.
Interdisciplinary Functional Restoration Works!

- Mayo Clinic: Chronic Pain Program, **n= 353; 3 weeks, 8 hrs/day**
- Focus on learning skills to improve function and foster sustained benefits
- Pre-treatment: opioid patients more interference, more likely on polypharmacy
- Patients tapered off opioids, same outcomes at 6 months as non-opioid patients

Cleveland Clinic Interdisciplinary Pain Program
- High dose opioid patients weaned from opioids same improvements in pain, depression, anxiety, and pain-related function vs lower dose or no opioids
- 73% of weaned patients remained off opioids
- Treatment benefits declined at 6 and 12 months but remained clinically significant.


Sandy: Comprehensive Evaluation

- **Pain Psychology**
  - Screening
    - PNI: General Depression
    - GAD-7: General Anxiety
    - PCS: Pain Scale
    - TSK: Kinesiophobia
  - Behavioral
    - Pain rating data
    - Pain level rating
  - Affective/Cognitive
    - Maladaptive pain related thought patterns
    - Depression and anxiety
  - Social
    - Single mother, 2 children, no family support
    - Physical and sexual trauma by mother’s ex-boyfriend

- **Pain Medicine**
  - Assessment
    - Widespread pain vs fibromyalgia syndrome
    - Anxiety disorder with depressed mood
    - Sleep disturbance
    - Opioid dependence: MGD 15 mg/day
  - Recommendation
    1. Structured Functional Restoration Program
    2. Medication Management:
      - Wean off carisoprodol
      - Initiate duloxetine
      - D/C “muscle relaxers”
      - Agreed plan for discontinuation of Opioids she is off

Functional Restoration Program

<table>
<thead>
<tr>
<th>Outcome Measures</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain VAS</td>
<td>Nursing Lecture</td>
<td>Group Stretching Class</td>
<td>Nursing Lecture</td>
</tr>
<tr>
<td>ODI (disability)</td>
<td>PT</td>
<td>PT Group</td>
<td>OT</td>
</tr>
<tr>
<td>GAD-7 (anxiety)</td>
<td>OT Visits</td>
<td>OT Group</td>
<td>OT</td>
</tr>
<tr>
<td>PHQ-9 (depression)</td>
<td>Psychology Group</td>
<td>Psychology</td>
<td></td>
</tr>
<tr>
<td>CRQ (activity engagement)</td>
<td>Relaxation Training</td>
<td>Relaxation Group</td>
<td>Relaxation Training</td>
</tr>
<tr>
<td>TSK (kinesiophobia)</td>
<td>Total</td>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>PCS (catastrophizing)</td>
<td>Total</td>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>Magnification</td>
<td>Total</td>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>Helplessness</td>
<td>Total</td>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>6 minute walk test (m)</td>
<td>Total</td>
<td>Total</td>
<td>Total</td>
</tr>
</tbody>
</table>

Treatment Team
- **Pain medicine**
  - Physical therapy (PT)
  - Occupational therapy (OT)
- **Pain psychology**
  - Relaxation training
  - Nursing education

Team Conference: Physician, Nurse, PT, OT, Psych, Relax Therapist
Physical Therapy Rehabilitation Approach

<table>
<thead>
<tr>
<th>WEEK 1</th>
<th>WEEK 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessments</td>
<td>Strengthening Exercises Conditioning</td>
</tr>
<tr>
<td>Movement-based Therapy</td>
<td>Aerobic Conditioning</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WEEK 3</th>
<th>WEEK 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuromobilization</td>
<td>Sex &amp; Chronic Pain (with Nurse)</td>
</tr>
<tr>
<td>&quot;Active&quot; vs &quot;Passive&quot; treatment</td>
<td>Home Exercise Plan</td>
</tr>
</tbody>
</table>

THERAPEUTIC EXERCISE TENS
• Massage Therapy Traction
• Cold & Heat Therapeutic Ultrasound
• Bracing

**Education About Your Body**

- FASCIA
- Body Mechanics
- Movement
- Tissue Healing
- Stretching/Strengthening
- Aerobic Conditioning
- Autonomic Nervous System
- Peripheral Sensors
- Motor Control

**Pain Neuroscience Education (PNE)**

- Traditional education model focused on anatomy, tissue injury or nociception
- PNE incorporates how nervous system, via peripheral and central sensitization, synaptic activity, and brain processing, interprets information from tissues
- Neural activation includes upregulation or downregulation
- Patients have ability to modulate pain experience
- Education focuses on the nervous system processing injury in conjunction with psychosocial aspects
- Pain is not always a “status of the tissues”


**Comprehensive PT Program**

- Education
- Strengthening
- Endurance
- Nutrition
- Sleep
- Emotional Health

- Putting it All Together
- Stretching
- Oxygenation
- Mindfulness
- Daily Integration
- Relaxation Techniques

Swedish Pain Services - Seattle, WA
## Occupational Therapy

<table>
<thead>
<tr>
<th>WEEK 1</th>
<th>WEEK 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessments</td>
<td>Posture &amp; Positioning</td>
</tr>
<tr>
<td>Pacing Techniques</td>
<td>Ergonomic Principles</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WEEK 3</th>
<th>WEEK 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity Tolerance</td>
<td>Realistic Schedule</td>
</tr>
<tr>
<td>Therapeutic Movement</td>
<td>Return to leisure &amp; vocational activities</td>
</tr>
<tr>
<td>Tai Chi</td>
<td>Qi Gong</td>
</tr>
</tbody>
</table>

### Occupational Therapy
- Posture
- Pacing Techniques
- Set goals and improve activity tolerance
- Activities of Daily Living: dressing, bathing
- Instrumental Activities of Daily Living (IADLs): homemaking, yard work, shopping, driving, sleeping, hobbies
- Sleep hygiene & positioning
- Therapeutic movement: Tai Chi, Qi Gong
- Joint protection and compensatory strategies

### OT: Pacing
- Time management
- Determine exact amount of activity that can be done without flare up
- Manage pain
- Conserve energy, do activities you value
- Set graded activity level or goals to increase activity level
- Breaking activities up into smaller tasks or parts
- Work at slower less intense pace, take breaks
Therapeutic Movement

- Tai Chi

https://www.youtube.com/watch?v=ZxcNBejxlzs&feature=youtu.be


Pain Psychology

<table>
<thead>
<tr>
<th>WEEK 1</th>
<th>COPING SKILLS TRAINING</th>
<th>EMOTION REGULATION</th>
<th>STRESS MANAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEEK 2</td>
<td>CBT MODEL OF PAIN</td>
<td>MSRB</td>
<td>COGNITIVE RESTRUCTURING</td>
</tr>
<tr>
<td>WEEK 3</td>
<td>ASSERTIVENESS</td>
<td>COMMUNICATION SKILLS</td>
<td></td>
</tr>
<tr>
<td>WEEK 4</td>
<td>BARRIERS TO SUCCES</td>
<td>FAMILY EDUCATION</td>
<td></td>
</tr>
</tbody>
</table>

CBT: Cognitive Behavioral Therapy
MSRB: Mindfulness Based Stress Reduction

Restoring Psychological Function

<table>
<thead>
<tr>
<th>SELF-REGULATORY APPROACHES</th>
<th>BEHAVIORAL APPROACHES</th>
<th>CBT</th>
<th>ACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility interaction between biological and psychological factors to increase individual’s sense of control over pain</td>
<td>Target pain behaviors</td>
<td>Addresses pain maladaptive behaviors/ cognitions through a goal-oriented, systematic procedure</td>
<td>Acceptance- and mindfulness-based intervention Emphasizes recognition and acceptance of emotions and cognitions, rather than recognition and change (ie, CBT)</td>
</tr>
<tr>
<td>Include biofeedback, relaxation training, hypnosis, and mindfulness</td>
<td>Include operant behavioral therapy and treatment of fear avoidance</td>
<td>Main components are understanding the treatment rationale, learning coping skills/training, and applying/maintaining coping skills</td>
<td></td>
</tr>
</tbody>
</table>

ACT=acceptance and commitment therapy; CBT=cognitive behavioral therapy.

Pain Psychology: MBSR Approach

- The Breath as an Anchor
- Stressful Experiences Diary
- Learning to Stay Present
- Unhelpful Habits of Mind
- Selective Attention
- Relying on Intuition
- Blaming, Personalization, and Labeling
- Mindful Activities
- Active Acceptance & Taking Care of Self

Relaxation Training

- Diaphragmatic Breathing
- Imagery and Visualization
- Progressive Muscle Relaxation (PMR)
- Biofeedback

Pain Education

- Orientation to program
- Pain pathways
- Sleep hygiene
- Nutrition
- Medications and side effects
- Pain Management Tool Box

“Fight-or-Flight”

Sympathetic Nervous System

Parasympathetic Nervous System

www.southshieldsdogwalker.com
Diaphragmatic Breathing

Diaphragmatic (Belly) Breathing
* Lay on your back * Legs and feet apart and relaxed (pillow under knees, optional) * Inhale and expand abdomen up to ceiling. Exhale and abdomen descends.
* Use 3-5lb ankle weight on abdomen for enhanced effect.
* Ensure the chest does not move and only the abdomen is moving with the breath.
* Perform this for 10-15 minutes focusing on the abdominal (diaphragmatic) movement and creating deep, slow breathing cycles.
* This breathing techniques helps to calm the nerves and balance the nervous system.

Sandy

- Physical Therapy
- Occupational Therapy
- Relaxation Training
- Pain Psychology
- Pain Education

Medication Plan:

Examined 2017 policies for LBP treatments
- Commercial and Medicare insurers regarded PT and OT as medically necessary, yet policies varied
- Wide variation existed for coverage for nonpharmacologic treatment for LBP
- Insurance executives more focused on opioid prescribing limits, and overprescribers, and less on improving access to nonpharmacologic therapies
- High number of prior authorizations, out-of-pocket expenses, and lack of coverage information common

Reality Check

- **Patient Access Factors**
- **Hospital/System Factors**
  - Fee for service vs value-based care
  - Salaries, Benefits
  - Reimbursement
  - Approval process

- **Behavioral Health Denials**
- **Co-Insurance, Co-pay**
- **Therapy Benefits**
- **Non-Coverage**
- **Transportation/Parking**

Pain Management Models: Revisited

- Parallel Practice
- Coordinated
- Interdisciplinary
- Multidisciplinary
- Integrative
  - Risk Stratify, PMP, Education, Engagement

- Acute
- Chronic Pain
- High Impact CP
  - Philosophy & Integration

- Biomedical
- Biopsychosocial

Pain Management

- Community Education & Support
- Emergency Department
- Primary Care: Patient Centered Medical Home
- Integrated Behavioral Health in Primary Care
- Inpatient: Transitions of Care
  - Interventional Procedures
  - Medical Management, Complimentary
  - Interdisciplinary Care: Functional Restoration
  - Complimentary and Integrative Care
- Addiction Medicine and Behavioral Medicine
Summary

- HHS Interagency Pain Task Force supports multidisciplinary care
- Current opioid overdose epidemic an opportunity to reshape care delivery
- Reviewed components and disciplines
  - Physical Therapy (PT): Find PT's with PNE focus
  - Occupational Therapy (OT) & Therapeutic Movement
  - Behavioral Medicine (Pain Psych)
  - Relaxation Training (RT)
- A Biopsychosocial Continuum

EXERCISE

- Your body
- Your mind
- Your soul

Advocate!
Thank you! steven.stanos@swedish.org

American Medical Association Resources
• end-opioid-epidemic.org

Relaxation Resources
UW Medicine Harborview: SCI
http://sri.washington.edu/pain/

YouTube videos on Qigong: Don Fiore or Paul Lam
https://www.youtube.com/watch?v=EaEZVfhm07o
Do you have an app for that?

Relaxation Training Exercises (commercial)
• I-Breathe
• Habit Bull
• Headspace

Nursing Education
• Understanding Chronic Pain
  • Acute versus Chronic pain
  • Biopsychosocial Model
  • Chronic Pain as an altered nervous system (sensitization)
  • Multiple factors can sensitize the nervous system (early trauma, pain, genetics)
• Medication Management
  • How do medications effect the nervous system
  • Weighing risks and benefits
  • Patient centered medication changes (managing withdrawal & other side effects)
• Alternate Coping Strategies
  • Pacing
  • Getting better sleep
  • Nutrition (anti-inflammatory diet)
  • Pain flare planning (a plan for not making it worse)

Pain Education

Explain Pain in 5 minutes
https://www.youtube.com/watch?v=C_3ph893rvl

Lorimar Mosely videos/websites
https://www.tamethebeast.org/#tame-the-beast
https://www.youtube.com/watch?v=gwd-wLdHijs
Pain Education

Neuroplasticity - Sentis - YouTube (3 minutes)
https://youtu.be/ELpfYCZa87g

The Brain That Changes Itself - Norman Doidge
(50 minutes)
https://www.youtube.com/watch?v=bFCOzm1P_cQg

Stress, Portrait of a Killer
https://www.youtube.com/watch?v=eYG0zuTv5rs

Wellness Resources

NIH Center for Complementary and Integrative Health,
Chronic Pain: In Depth
https://nccih.nih.gov/health/pain/chronic.htm

NIH: Sleep Resources
https://nccih.nih.gov/health/sleep/ataglance.htm
https://www.nia.nih.gov/health/good-nights-sleep

Harvard School of Public Health Nutrition Resources
https://www.hsph.harvard.edu/nutritionsource/

• Mindfulness and Neuroplasticity YouTube
  • https://youtu.be/7TN23YdGo4Q
Meditation Resources

Introduction to Mindfulness-Based Stress Reduction (MBSR) by Dr. Ron Siegel:  [https://www.youtube.com/watch?v=aPlG_wK0g0E](https://www.youtube.com/watch?v=aPlG_wK0g0E)

It’s not so strange... it’s
Physical Therapy
Monique Serpas, PT, DPT, OCS

Now I want to know a little about you

PollEv.com/moniqueserpa909
Or
Text MONIQUESERPA909 to 22333

Objectives

• Define physical therapy modalities
• Discuss physical modalities PTs use
• Modalities as part of the treatment plan
• The Comprehensive Pain Rehabilitation Program (CPRP)
What are modalities?

- Electrical
- Photochemical
- Physical
- Thermal

Thermal Modalities

- Moist heat packs
- Cold packs
- Cold with compression
- Diathermy
  - The application of high frequency electromagnetic energy to produce heat within tissues

Thermal Modalities- Ultrasound

- Ultrasound (US)
  - US is a mechanical wave in which energy is transmitted by the vibrations of molecules in a biologic medium through which the wave is traveling
  - Indications: soft tissue shortening and scars, pain, tendon injuries, fractures
Thermal Modalities- Phonophoresis

- The application of US with a topical drug to facilitate transdermal drug delivery
- Increases transdermal drug penetration by:
  - increasing the permeability of the stratum corneum by dilating hair follicle and sweat glands
  - increasing kinetic energy of the molecules in the drug and in the cell membrane
  - increasing circulation to the area being treated

Electrical Modalities

- Transcutaneous Electrical Nerve Stimulation (TENS)
- Interferential Current
- Neuromuscular Electrical Stimulation (NMES)

Iontophoresis

- Use of electrical current to aid in medication administration
Laser\textsuperscript{1-5}

- Photochemical effects
- Used for pain management in arthritis and muscle spasm
- More effective than placebo and ultrasound with subacromial impingement
- Not effective for tendinopathies

Physical Modalities- Traction\textsuperscript{23-26}

- The application of a mechanical force in a way that separates the joint surfaces, reduces pressure between body parts and elongates surrounding soft tissues

Taping\textsuperscript{15-22}

- Leukotape
  - Arch support
  - Patellofemoral dysfunction
  - Posture
  - Muscle inhibition

- Kinesiotape
  - Pain
  - Posture
  - Edema

[Duck Tape Max] by JeepersMedia is licensed under CC BY 2.0
Therapeutic Dry Needling$^{6-14, 27}$

○ Use of a filiform needle to treat soft tissue dysfunction

Objectives

• Define physical therapy modalities
• Discuss physical modalities PTs use
• Modalities as part of the treatment plan
• The Comprehensive Pain Rehabilitation Program (CPRP)

Modalities

It's just a piece of the pie!
Objectives

- Define physical therapy modalities
- Discuss physical modalities PTs use
- Modalities as part of the treatment plan
  - The Comprehensive Pain Rehabilitation Program (CPRP)
CPRP PT Outcomes

**Improved Walking Endurance**

**Improved Lower Extremity Strength**

**Improved Knowledge of Pain**

Any Questions?

Thank you for having me! I hope you had a great conference!

References


References


OBJECTIVE: Brachial neuritis, also known as Parsonage-Turner syndrome, is a rare cause of shoulder pain and weakness and is often misdiagnosed. The objective of this case report is to describe a rare cause of brachial neuritis, discuss how this diagnosis can be made from the pain medicine clinic and how the condition should be treated.

CASE DESCRIPTION (methods and results): A previously healthy 55-year old Caucasian male was referred to our clinic for an evaluation of shoulder pain and weakness. The patient had sudden onset severe, electric, right sided neck and arm pain a few weeks after receiving his annual flu vaccine. His PCP treated this conservatively and his pain improved however he continued to have shoulder weakness.

On examination we noted winging of his right scapula and decreased shoulder muscle bulk. There was mild weakness in shoulder abduction and elbow flexion and extension. EMG was indicative of right brachial plexopathy localized to the upper trunk. The patient was treated conservatively with structured physical therapy and demonstrated steady improvement in strength over time.

CONCLUSION: Brachial neuritis is an uncommon disorder that can closely mimic cervical radiculopathy. The exact etiology is unclear, however it is thought to be immune-mediated and in our case, possibly a side effect of influenza vaccine. The classic presentation is acute onset of severe shoulder and/or arm pain which dissipates over weeks and is followed by shoulder weakness. Physical exam should note abnormal shoulder movement, scapular dyskinesis, myotomal weakness patterns, and atrophy. Treatment is conservative. If pain persists, oral steroids can be used. Extensive physical therapy is used and in most cases, full resolution occurs after 3 years.

KEY WORDS: Brachial neuritis, EMG, cervical radiculopathy

SUMMARY: Brachial neuritis can masquerade as cervical radiculopathy. This is a case report and exploration of the current state of the literature.
Retrospective Review of Efficacy and Safety of Radiofrequency Ablation of the Genicular Nerves of the Knee

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OBJECTIVES: Radiofrequency ablation (RFA) of the genicular nerves of the knee has been shown to be an effective and safe option to treat patients with intractable knee pain in the general population [1]. Our study seeks to confirm that American military veterans feel the same as their non-veteran peers.

METHODS: We reviewed electronic medical records and conducted phone interviews with 8 veterans who had knee RFA from 2008-2019. Our primary outcome measure was whether veterans would recommend knee RFA to their peers. Secondary measures were the improvements in activities of daily living.

RESULTS: 6 out of 8 veterans recommended knee RFA to their peers. There were no serious complications with knee RFA in this group.
Conclusion: Based on this small retrospective cohort study, it seems that knee RFA is effective and safe for veterans at SLVHCS.

KEYWORDS: radiofrequency ablation of the knee, knee osteoarthritis, genicular knee nerves.

CONFLICTS OF INTEREST: The authors have no financial interests in the material or devices described in this article and received no financial support in the generation of this submission.

REFERENCES:

Retrospective Review of Efficacy and Safety of Spinal Cord Stimulators (SCS)

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OBJECTIVES: Spinal cord stimulation (SCS) has been shown to be an effective and safe option to treat patients with intractable pain in the general population [1,2]. Our study seeks to confirm that United States military veterans are getting effective and safe treatment similar to their non-veteran peers.

METHODS AND MATERIALS: We reviewed electronic medical records and conducted phone interviews with 51 veterans who had SCS from 2008-2019 at the New Orleans Veterans Affairs Medical Center of New Orleans. Our primary outcome measure was whether veterans would recommend SCS to their peers. We feel that veterans would only recommend SCS if they benefitted from it, and it was safe. Secondary outcome measures were improvements in activities of daily living and ability to decrease opioid pain medications.

RESULTS: 75% of veterans recommended SCS to their peers. There were no permanent neurological deficits or deaths as a result of SCS. One patient developed an infection overlying the generator site 8 months post-implant; this was treated with generator explant, and there were no neurological sequelae. Interestingly, this patient who had explant reported only 30% pain relief, and he was eager to get a new generator implanted.

CONCLUSION: SCS is effective and safe for veterans in this review at the New Orleans VA Medical Center.

LIMITATIONS: This study is not randomized. It is retrospective and is a subjective questionnaire. Keywords: spinal cord stimulator, neuromodulation, post-laminectomy syndrome.
Conflict of Interest: The authors have no financial interests in the material or devices described in this article and received no financial support in the generation of this submission.

REFERENCES:
Effectiveness of Long Term Opioid Use for Long Term Pain Management

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OBJECTIVES: The purpose of this study was to assess the effectiveness of long-term opioids for managing chronic pain.

BACKGROUND: Chronic pain has been managed with opioids for many years throughout the world. More recently there have been questions concerning the effectiveness in managing pain over long periods of time with opioids.

METHODS: Requests from patients treated with opioid medications for longer than 1 year were reviewed retrospectively. Data from September 1, 2016 to December 1, 2016 was recorded using a Chronic Pain Medication Request Form. A numeric pain scale was used to document self-reported pain intensity levels with and without pain medication. Acceptable pain intensity levels and duration of opioid treatment were assessed. Ten years was the maximum period of treatment assessed because reliable information beyond 10 years was difficult to obtain from the Electronic Medical Record. Data was analyzed using the t-Test with two sample assuming unequal variances with significance at the 99% confidence level.

RESULTS: Fifty patients on opioid pain medication were evaluated. The average duration of opioid therapy was 9.5 years. The average acceptable pain level was 4.0 with the median 4.44. The average pain level without medication was 9.10 with the median 9.00. The average pain levels while on opioid medication were 4.46 with the median 4.50. The average difference in pain levels with and without the opioid medication was 5.00 with the median 4.64. The pain levels perceived to be lower than the acceptable level while on opioid medication was 0.02 with the median difference 0.00.

CONCLUSIONS: We conclude that the use of opioid analgesics provide acceptable levels of pain control even after long-term use.
The Role of Executive Functioning on Pain Sensitivity

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OBJECTIVE: The purpose of this research was to examine the interrelationships between psychological factors, such as pain catastrophizing, cognitive inhibition, and perceived pain intensity following induced noxious cold pain. Catastrophizing may interfere with inhibiting attention to pain in order to engage in other tasks. Therefore, we hypothesized that greater cognitive inhibition would mediate the effects of pain catastrophizing on perceived pain severity at threshold and tolerance in experimental pain.

METHODS: 62 healthy undergraduate students participated in the study. Participants’ level of catastrophizing about prior painful experiences was measured as well as their performance on a color-word inhibition task (Stroop procedure). Participants then underwent the cold pressor test to measure pain intensity at threshold and tolerance. Effects of mediation were tested using an established regression-based approach.

RESULTS: The level of pain catastrophizing of prior painful experiences was inversely related to color-word inhibition performance. As hypothesized, performance on the inhibition task mediated the relationship between prior pain catastrophizing and participant’s reported pain intensity at threshold. However, performance on the cognitive inhibition task did not mediate the relationship between catastrophizing and pain intensity at tolerance.

CONCLUSIONS: Pain catastrophizing exerts its effect on pain intensity through decreased cognitive inhibition at pain threshold, but not tolerance. Our perception of pain and painful experiences, based on cognition and affect, can determine the overall physical experience. Improving cognitive inhibition skills may reduce pain sensitivity through larger studies with clinical pain populations are needed.

SUMMARY: Data were analyzed from an experimental pain procedure assessing pain intensity at threshold and tolerance. Results revealed cognitive inhibition to mediate the relationship between catastrophizing and pain intensity at threshold, but not at tolerance. Executive functions, such as cognitive inhibition, may be a point of target in reducing pain sensitivity.

KEY WORDS: pain catastrophizing, Stroop, cognitive inhibition, pain outcomes
Case Report: Baastrup’s Disease and Interventional Management

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OBJECTIVE: Baastrup’s disease is a disorder of the lumbar vertebral column in which adjacent spinous processes enlarge and come in close contact due to degenerative changes, most commonly seen at L4/L5. Presentation most commonly occurs in the elderly population with a peak incidence of 80 years. On imaging, the posterior spinous processes may appear to touch or “kiss” each other, especially in lumbar extension, giving this disease the moniker, “kissing spines syndrome.”

METHODS: Two patients diagnosed with Baastrup’s disease at Southeast Louisiana Veteran’s Health Care System interventional pain clinic were selected for participation.

RESULTS: Patient one was a 34-year-old gentleman who had failed conservative management with physical therapy and was given an interspinous ligament injection with depomedrol under fluoroscopy. The second patient was a 60-year-old gentleman who had failed previous lumbar epidural injections and trigger point injections, and was given an interspinous ligament injection with decadron without any imaging guidance.

CONCLUSION: Both cases presented with chronic midline low back pain that worsened on extension and had MRI findings suggesting Baastrup’s disease in the setting of variable degenerative changes. Although both patients had immediate relief, longer follow-up is needed to monitor efficacy of the injections.

SUMMARY: Baastrup’s disease is a commonly overlooked, misdiagnosed, and mistreated source of chronic low back pain. Symptoms of Baastrup’s disease include midline low back pain that is worsened with extension movements, which is very similar to facetogenic low back pain. An interspinous ligament steroid injection can be done safely even without imaging; and should be considered in patients with this type of pain along with MRI findings suggesting an interspinous pathology.

KEY WORDS: Baastrup’s disease, interspinous, kissing spine, low back pain, lumbar extension pain
Tarlov Cyst-Induced Cauda Equina Syndrome: Case Presentation

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OBJECTIVE: Sacral perineural cysts, commonly known as Tarlov Cysts are collections of CSF involving extradural nerve roots of sacral or coccygeal nerve fibers. The etiology remains unknown and the cysts are frequently found as incidental findings on MRI. Although often asymptomatic, Tarlov cysts can cause serious clinical symptoms and therefore should not be overlooked. We describe a case of a middle-aged woman with progressive cauda equina syndrome from sacral nerve root compression from Tarlov cysts.

METHODS: Large regional metropolitan hospital single case report.

RESULTS: A 51 year-old female in our pain management practice with numbness in legs and perineal area. She had a remote fall which resulted in low back pain. MRI was notable for sacral perineural cysts (Tarlov cysts). Neurosurgery was consulted after progressive numbness, pain and urinary retention. The patient underwent sacral laminectomy, dissection of sacral nerve roots compressed by Tarlov cysts, and muscle graft placements. Patient was seen 3 weeks post-op with some resolution of her dysesthesias and pain however complicated by post-op pain. Our patient continues to follow-up with neurosurgery and we are treating her post-operative and continued neuropathic pain.

CONCLUSION: Although often asymptomatic, Tarlov cysts can cause serious clinical symptoms and therefore should not be overlooked. Etiology is unknown but some literature notes traumatic exacerbation. Diagnosis is that of exclusion, but clinicians should be aware of this rare and possibly disabling disease.

SUMMARY: This case represents a rare case of new, progressive neurologic deficits in a patient with Tarlov cysts. Treatment can be difficult with either interventional or surgical techniques with inconsistent results and outcomes.

KEY WORDS: Tarlov cyst, Sacral peri-neural cyst, cauda equina syndrome, low back pain
Examining the Effectiveness of Group-Based Acceptance and Commitment Therapy for Veterans with Chronic Pain

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OBJECTIVE: The purpose of this project was to assess the acceptability, feasibility, and utility of an Acceptance and Commitment Therapy (ACT) group delivered to Veterans with chronic pain. Although research supports the role of ACT in treating chronic pain patients, little is known about the utility of this treatment among Veterans in a group format.

METHODS: Veterans (N=9) with chronic pain were offered to participate in a 10-week ACT group. Pre- and post self-report data were collected with the Pain Intensity, Enjoyment, and General Activity Scale (PEG), the Pain Self Efficacy Questionnaire-2 (PSEQ-2), the Chronic Pain Acceptance Questionnaire-8 (CPAQ-8), and the Valued Living Questionnaire (VLQ).

RESULTS: Five paired samples t-tests were conducted to compare pre- and post-scores on all measures. Significant changes in pre- to post-scores were found across all measures (all p’s < 0.03), with the exception of the two VLQ subscales. The VLQ Action subscale results were trending toward significance, t(8)= -2.21, p= 0.06. The VLQ Importance subscale changes from pre to post were not significant, t(8)= 0.09, p= 0.93.

CONCLUSION: This preliminary data suggests the group resulted in increased pain self-efficacy, pain acceptance, and valued action while also reducing pain intensity. Continuing to offer this additional treatment option may engage more veterans that do not respond to the existing offerings.

KEY WORDS: ACT, Chronic Pain, Veterans

SUMMARY: Participants were offered to participate in an ACT group, focused on increasing psychologically flexible through mindfulness and behavioral change strategies. Significant change were observed from pre- to post-measures, suggesting the group had an impact on participants’ pain intensity, activity level, pain acceptance, and self efficacy.
Psychological Resilience and Painful Adversity: the Effects of Grit and Optimism on Cold-Pressor Pain

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OBJECTIVE: This experiment analyzed the interconnected relationships between several positive psychological factors and their effects on cold-pressor (CP) pain experience and attenuation. Specifically, the moderating powers of grit and dispositional optimism were examined in context of CP pain and psychological resilience.

METHODS: Experimental measures included the Revised Life Orientation Test (LOT-R; optimism), the Grit Scale, the Connor-Davidson Resilience Scale (CD-RISC), and simple numerical pain scales and times at pain threshold and tolerance. Healthy, college-aged participants completed these measures along with a CP task. The strength of moderation of grit/optimism on the resilience and pain relationship were then evaluated via Johnson-Neyman procedure.

RESULTS: Zero-order correlations show initial support for interconnectedness of grit, optimism, resilience and pain. When an individual scored highly in resilience, it was found that both grit and optimism were significant moderators in time to pain threshold. Furthermore, optimism was found to be a significant moderator in the time to pain tolerance pathway as well.

CONCLUSIONS: In individuals with high levels of resilience, both grit and optimism can have tangible effects on CP pain. These findings show positive psychological factors can affect pain outcomes, as well as provide positive, protective options for pain attenuation.

SUMMARY: Over the course of the CP pain task, grit and optimism moderate the resilience-pain threshold pathway, and optimism moderates the resilience-pain tolerance interaction, in individuals who scored highly on trait resilience. This study shows evidence for protective psychological factors in the pain experience, however limited to a healthy experimental population.

KEY WORDS: Pain, grit, psychological resilience, optimism
Liposomal Bupivacaine and Novel Local Anesthetic Formulations

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OBJECTIVE: To review liposomal bupivacaine and new versions on the horizon for regional and chronic pain procedures.

METHODS: Using a collaboration of recent PubMed articles, liposomal bupivacaine as well as new versions in clinical trials for acute and chronic pain procedures was studied.

RESULTS: Novel preparations allowing for extending duration of action of local anesthetics have many clinically relevant benefits. In this regard, the development of liposomal bupivacaine has the potential to significantly impact patient care by improving perioperative pain control. The unique liposomal bilayer that encapsulates bupivacaine allows for a sustained release of local anesthetic for up to 72 hours after a single use and can significantly decrease post-operative opioid consumption. Current evidence supports liposomal bupivacaine use for infiltration into surgical sites to help decrease post-surgical incisional pain via transverse abdominis plane (TAP) and interscalene brachial plexus nerve blocks (ISB). SABER-bupivacaine is another depot formulation that is a sustained release of bupivacaine of encapsulated bupivacaine in a biodegradeable sucrose acetate isobutyrate biolayer. HTX-011 is an investigational extended release local anesthetic formulation currently undergoing Phase 3 clinical trials. HTX-011 is composed of a bioerodible polymer with bupivacaine and low dose meloxicam in which the polymer undergoes hydrolysis and allows for sustained release of bupivacaine and meloxicam over 3 days.

CONCLUSION: As implementation of regional anesthetic techniques continues to grow and become standard of care, clinicians need to be cognizant of the pharmacologic and physiologic properties of the medications used. While FDA approved indications are currently relatively limited, these will no doubt expand in the coming years as larger studies are performed and more evidence is ascertained.

KEY WORDS: local anesthetic, bupivacaine, liposomes, microspheres

SUMMARY: Liposomal bupivacaine has proven to have a significant benefit on patient satisfaction, outcomes, and safety in the perioperative setting. The development of novel extended release local anesthetic formulations will likely play a major role for opioid sparing techniques in the future.
OBJECTIVE: to evaluate the safety and efficacy of ultrasound technology for chronic pain procedures.

METHODS: Using a collaboration of recent PubMed articles, ultrasound use in chronic pain procedures was studied.

RESULTS: Compared to both landmark based techniques as well as fluoroscopy, ultrasound technology has the distinct advantage of not only being able to visualize one’s target site for an interventional procedure, but also the surrounding structures that ought to be avoided such as the lung pleura or nearby vasculature. These advantages have been demonstrated throughout many studies in multiple other areas of medicine, but the data remains somewhat murky with respect to interventional pain procedures. The use of ultrasound is currently limited for most neuraxial pain procedures as fluoroscopy provides superior images for these procedures. For certain procedures such as stellate ganglion, cervical plexus, peripheral joints and transforaminal blocks, studies have suggested an improved safety profile given the ability to minimize the risks of vascular violation or arterial injection. Along with both decreased radiation exposure and decreased overall procedural time, these advantages might allow us to infer a superiority of ultrasound imaging modality and allow for encouragement for its use of the technology throughout pain practices. Lastly, the use of ultrasound for needle guidance has been demonstrated to be highly variable based on operator experience.

CONCLUSION: As members of the pain community become more accustomed to using the technology and the source data grows, it will be interesting to see if there is a more definitive advantage of the technology.

KEY WORDS: Ultrasound, fluoroscopy, chronic pain, injections

SUMMARY: Chronic pain management techniques have evolved in recent years. In this regard, ultrasound technology has become a standard for most acute pain procedures and essential for postsurgical pain relief and enhanced recovery after surgery. Ultrasound possesses several benefits when compared to fluoroscopy, including elimination of radiation exposure while providing for similar clinical outcomes, but ultrasound use is currently limited for neuraxial pain procedures. In summary ultrasound use for chronic pain procedures is emerging as a viable, safe, and effective modality.