Non-Opioid Pain Management

2019 Workers' Compensation Educational Conference
Portland, Oregon
17 October 2019

- Background:
  - Physiatrist with extensive experience with opioid and non-opioid pain management
  - Last practice was ~60-70% WC, providing an opportunity to become familiar with the workings of the WC system: including patient, employer, adjustor, and case manager interactions
- Conflicts of Interest: There are no financial or other forms of compensation to disclose.

Overview

- National Opioid Crisis
- Pathophysiology of pain
- Systematic review of pain treatment options
  - Lifestyle modifications
  - Pharmacological
  - Service-oriented
  - Interventional
  - Surgical
  - Possibly questionable alternatives

Background

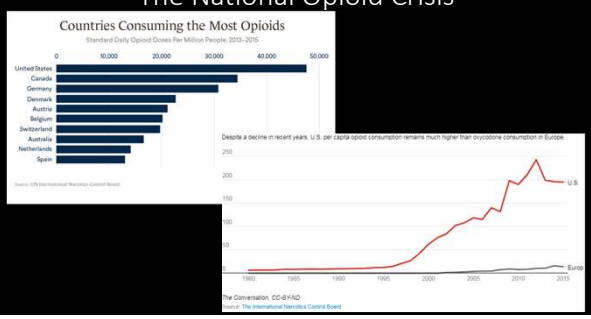
Opiates vs. Opioids vs. Narcotics

- Narcotic—any agent that produces insensibility or narcosis
  - Umbrella term for pain killers (opiates and opioids)
- Opiates—natural substances derived from the opium poppy (Ex: opium, morphine, codeine)
- Opioids (often used interchangeably with the term narcotics)—Products that bind to the same receptors as opiates, but do not occur naturally
  - Semi-synthetic—chemically modified opiates (Ex: oxycodone, hydrocodone)
  - Synthetic—chemically manufactured substances that interact with the same biological receptors as opiates (Ex: fentanyl, methadone)

Background

- Regardless of our treatment options, pain is not going away
  - The Institute of Medicine estimates that 100M of American adults suffer from chronic pain[1]
  - There multiple factors contributing to this
    - Human average lifespans have significantly increased over the past century
    - Levels of activity have decreased proportionately to modern comforts
    - Common diets have more calories and a greater pro-inflammatory profile compared to those of past decades
    - Rates of obesity have increased

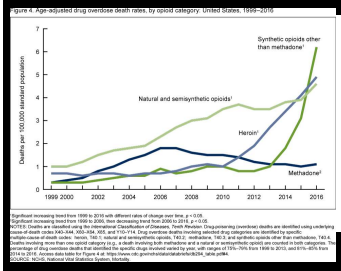
The National Opioid Crisis

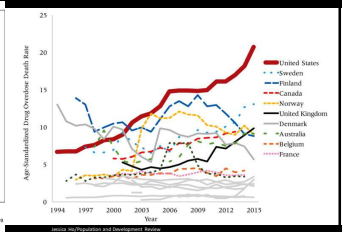


The National Opioid Crisis

- Estimates for cost of pain care: $560-635 billion annually (exceeds expenditures for heart disease, cancer, and diabetes combined)[2]
- Between 2007 and 2014, opioid dependence rose by 3,203% among privately insured patients in middle-class, non-urban communities[3]
- Prescription opioids are the most common gateway to heroin, and overdose deaths of Rx opioids now exceed deaths from heroin and cocaine combined[4]
- The U.S. prescribes 50x more opioids that the rest of the world combined[5]

The National Opioid Crisis





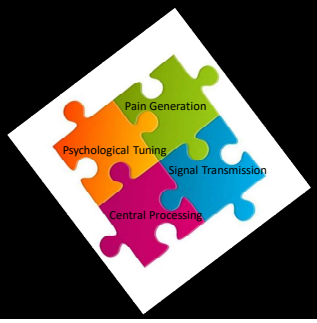
The National Opioid Crisis

- How did we get here?
  - 1980 N Engl J Med publishes "Addiction rare in patients treated with narcotics"
    - Letter to the editor, "study" followed inpatients who received as little as a single dose and no outpatient follow up. It was widely misquoted as evidence of opioid's safety profile[6]
  - 1996 American Academy of Pain trademarks the slogan: "Pain: The Fifth Vital Sign"
  - In 2001, the Joint Commission establishes policy that "Pain is the 5th vital sign"
    - With governmental policy mandating documentation of a subjective sensation, measured by an inaccurate, poorly reproducible measuring tool, physicians felt obligated to prescribe narcotics at the risk of the malpractice of ignoring of undertreating pain
  - Pharmaceutical corporation pressure and availability continued to peak over the next decade

The National Opioid Crisis

- How do we get out of here?
  - De-emphasize the importance of opioid pain killers
    - Opioids are appropriate for short-term (<3 weeks) pain relief
    - THEREFORE: Any injury/condition that is expected to demonstrate persisting pain >3 weeks, narcotics should be avoided (except for palliative care)
    - Opioids are NOT appropriate for long-term pain relief
  - Shift in pain management focus from single-tool approach to a multi-modal process of "surrounding the pain" by targeting different areas of:
    - Pain generation
    - Transmission
    - Processing
    - Interpretation

The Solution



Case Study

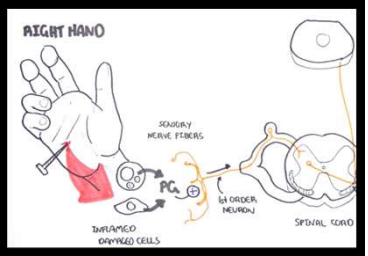
- Autumn, 2009. Moscow, Russia…(somewhere outside of HIPPA's reach)
- Julia Popova, 22 was mugged while walking home from the office. Walked another 40 minutes after the attack
- Only became aware of her injury after her parents alerted her to it upon her arrival at home 40 minutes later
- Surgeons removed a 6-inch blade. She had a good recovery

Case Study

- Why?
- Why didn't she notice the knife?
- Why didn't she feel any pain?
- What was it that prevented the transmission of pain from the injury site to her conscious awareness?

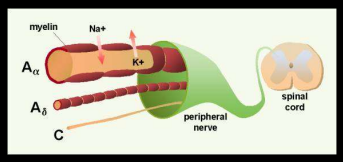
Pathophysiology of Pain: Initiation

- Pain Initiation
  - Painful stimuli activate pain receptors (heat, cold, pressure)
  - Injured tissues release inflammatory markers (prostaglandins) initiating an auxiliary pathway via chemical means
  - Inhibitors of the chemical pathways include NSAIDs, Corticosteroids



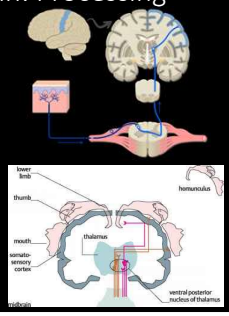
Pathophysiology of Pain: Transmission

- Pain Transmission
  - Painful stimulus triggers pain receptors which send a signal to the spinal cord
    - Thermomechanoreceptors—pinprick and sudden heat
      - Transmit information to the spinal cord via fast myelinated Aδ nerve fibers
    - Polymodal receptors—internal chemical stimuli (prostaglandins, bradykinins, inflammatory cytokines)
      - Transmit information to the spinal cord via slow conducting C fibers
  - Transmission Inhibitors: Local anesthetics, TENS unit



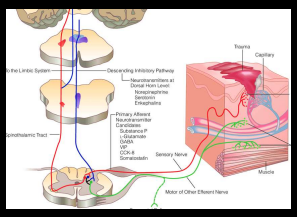
Pathophysiology of Pain: Processing

- Pain Transmission/Processing
- Ascending Pathway
  - Peripheral Nerve (1st order neuron)
  - Synapses in the dorsal horn of the spinal cord (2nd order neuron)
  - Decussates to the opposite spinothalamic tract, ascends to the brain
  - Enters thalamus (central processing/distribution)
  - Synapses with 3rd order neuron and out to sensory cortex (homunculus)



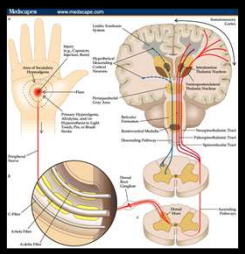
Pathophysiology of Pain: Processing

- Pain Transmission/Processing
- Descending Pathway
  - Controls/inhibits activity of the ascending pathway
  - Releases enkephalins (endogenous opioids) which block 1st order nerve transmission, and decrease excitation of 2nd order nerve

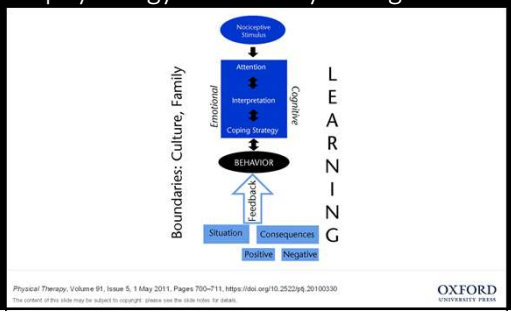


Pathophysiology of Pain: Processing

- Pain Transmission/Processing
- Gate Control Theory
  - Pain transmission gates are opened by C-fibers
  - Pain gates are closed by Aβ fibers and the descending pathway
  - The dominant tone of opening/closing pressure will allow for pain transmission/blockage
- Inhibited by local anesthetics, opioids, Alpha-2 agonists



Pathophysiology of Pain: Psychological Tuning



Physical Therapy, Volume 91, Issue 5, 1 May 2011, Pages 700–711, https://doi.org/10.2522/ptj.20100330

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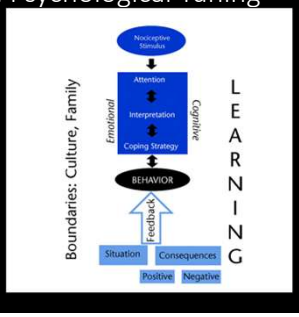
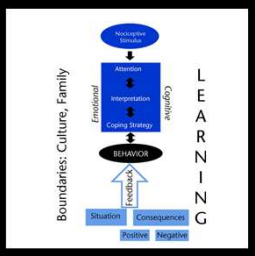
Pathophysiology of Pain: Psychological Tuning

- Attention
  - Establishes awareness of danger/injury
  - When attention becomes excessive (vigilance) may increase emotional input and worsen pain
  - Treatment strategies: Distraction



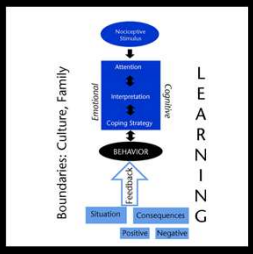
Pathophysiology of Pain: Psychological Tuning

- Interpretation
  - Higher-order processing of painful input
  - Highly intertwined with emotional "shading"
  - Provides context for the nociceptive input
    - Example: Would you rather get 50 needle sticks in one minute or 5 needle sticks in 5 minutes?



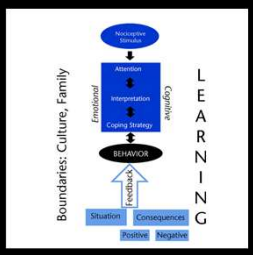
Pathophysiology of Pain: Psychological Tuning

- Interpretation is influenced by several processing elements
  - Beliefs and attitudes
    - "Hurt is harm" vs. "No pain, no gain"
  - Expectations and Cognitive sets
    - One's understanding of injury and recovery process affects outcome
    - Catastrophizing
  - Emotions
    - Negative affect, fear, anxiety, and depression portend a worse outcome



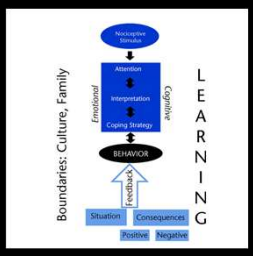
Pathophysiology of Pain: Psychological Tuning

- Coping Strategies
  - Learned integration of emotional, cognitive, and behavioral responses
  - May be implemented without conscious thought or via deliberate decision
  - Once activated, the strategy(ies) will likely influence behavioral attempts to cope with pain throughout recovery



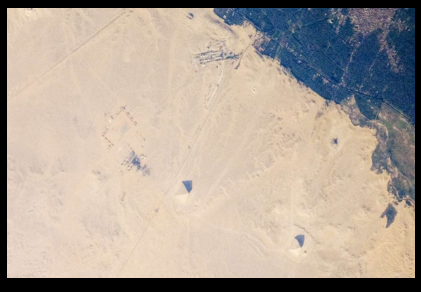
Pathophysiology of Pain: Psychological Tuning

- Pain Behavior
  - Behaviors including taking analgesics, seeking care, resting, and certain thoughts and emotions.
  - Pain behaviors are reinforced by direct consequences including reduction of pain, as well as social feedback
    - Positive Feedback: Increased activity/fitness, improved adaptability to other life stressors
    - Negative Feedback: Fear avoidance, Munchhausen's
  - Pain behaviors are likely to become habitual, and may become assimilated into personality
  - EDUCATION, EDUCATION, EDUCATION!!![7]



Systematic Reviews/Meta-analyses

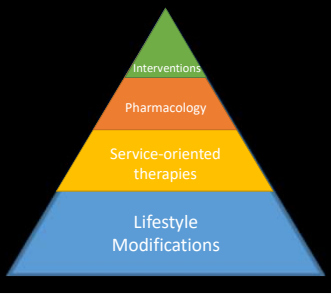
Systematic Reviews/Meta-analyses



Systematic Reviews

- Problem: Published literature is replete with many conflicting data and studies.
  - Research bias, poorly designed research, statistical analysis, obsolete technique, few subject numbers
- Meta-analyses (the 20,000 ft view)
  - Combine studies bases on similarities identified in research question, study design, outcomes, etc.
  - Useful in providing a broader understanding of research (qualitative data)
  - Less useful in providing specific detail of specific outcomes (quantitative data)
  - Many studies which don't meet selection criteria are discarded
  - Usually includes graded degree of evidence (High, Moderate, or Low quality)
  - Bias due to selective inclusion and reporting of outcomes in systematic reviews[8]

Systematic Review of Treatment Options



Systematic Review of Treatment Options: Lifestyle Modifications

- Exercise:
  - Moderate quality evidence that post-treatment exercise programs prevent recurrence of LBP [9]
  - Chronic LBP: Exercise appears to be slightly effective at decreasing pain and improving function
  - Subacute LBP: Some evidence that a graded activity program improves absenteeism
  - Acute LBP: Exercise is as effective as no treatment or other conservative treatments[10]
  - Advice to Stay active vs. Bedrest: Moderate evidence shows that patients with acute LBP may experience small benefit in pain relief and functional improvement over those who pursue bedrest as treatment[11]
  - Low-quality data suggest that in chronic pain there is a small-moderate reduction in pain severity with exercise program[12]

Systematic Review of Treatment Options: Lifestyle Modifications

- Yoga:
  - Low/moderate evidence that yoga results in small to moderate improvement in function at 3 and 6 months when compared to no exercise at all
  - Possibly slightly more effective for pain (than no exercise) at 3 and 6 months, though there were deficiencies in the data for this metric
  - Uncertain how yoga compares to other exercises or whether yoga PLUS other exercises is superior as a treatment for back pain[13]
  - Other studies support the mind-body benefits of meditation and exercise inherent to yoga as beneficial for anxiety
- Aquatic Therapy:
  - Low-Moderate quality evidence suggests that aquatic training is beneficial for improving wellness, symptoms, and fitness in adults with fibromyalgia—similar to that of land-based exercises except for muscle strength, which showed very low quality evidence favoring land-based exercise[14]

Systematic Review of Treatment Options: Lifestyle Modifications

- Sleep:
  - Impaired sleep results in increased pain sensitivity[15]
- Weight Loss:
  - Weight loss has demonstrated decrease in MSK pain, Headaches, and fibromyalgia[16]
- Smoking Cessation:
  - Evidence that nicotine may slightly decrease pain acutely,[17] but long term exposure is a risk factor for chronic pain

Systematic Review of Treatment Options: Service-oriented Therapies

- Physical Therapy:
  - Application of classical physiotherapy proposals yields results that are not very effective in the management of chronic non-specific low back pain[18]
  - Low evidence that PT has moderate beneficial benefits on pain across patient populations and interventions[19]
- Psychological and Behavioral Therapy:
  - Cognitive Behavioral Therapy has small effects on disability a/w chronic pain with some maintenance out to 6 months. CBT is effective in altering mood and catastrophizing outcomes. CBT is a useful approach to the management of chronic pain[20]
  - Behavioral therapy is more effective than usual care for short-term relief of chronic low back pain, but there is no difference for intermediate- or long-term relief [21]

Systematic Review of Treatment Options: Service-oriented Therapies

- Spinal manipulative therapy (chiropraxis, OMM):
  - Acute LBP
    - Low-quality evidence that SMT is no more effective than inert interventions, sham, or in combination with standard treatments, no more effective than other therapies
    - Safe compared to other treatments
    - Considerations of cost[22]
  - Chronic LBP
    - High-quality evidence suggests that SMT is no better or worse than other interventions for reducing pain and improving function
    - Determining cost-effectiveness of care is a high priority[23]

Systematic Review of Treatment Options: Service-oriented Therapies

- TENS (Transcutaneous electrical nerve stimulation):
  - Weak evidence that TENS reduces pain intensity over that of placebo when used as a standalone treatment for acute pain[24]
- Massage Therapy:
  - Acute, sub-acute, and chronic LBP had improvements in pain from massage for short-term follow up only
  - Functional improvement was observed in sub-acute and chronic LBP, but for short-term follow up only
  - No long-term benefits were noted[25]

Systematic Review of Treatment Options: Service-oriented Therapies

- Acupuncture:
  - Insufficient evidence to support or refute use of acupuncture for neuropathic pain[26]
  - Placebo-controlled trials show statistically significant benefits for pain in peripheral joint osteoarthritis, however these benefits are small and do not meet thresholds of clinical relevance[27]
- Traction:
  - Literature does not support or refute effectiveness of continuous or intermittent traction for pain relief or functional improvement when compared to placebo in patients with chronic neck pain[28]
  - Traction alone, or in combination with other treatments has little or no impact on pain intensity, functional status, global improvement, or return to work in people with low back pain[29]

Systematic Review of Treatment Options: Pharmacology

- NSAIDs:
  - Low evidence that NSAIDs are more effective than placebo at decreasing pain intensity and disability in chronic low back pain
  - There is no difference in efficacy between NSAID types
  - Insufficient data regarding safety of long-term use[30]
  - No evidence to support or refute the use of oral NSAIDs to treat neuropathic pain conditions[31]
- Muscle Relaxants:
  - Strong evidence that muscle relaxants are more effective than placebo for short-term acute low back pain
  - Adverse events were significantly more prevalent than in placebo groups
  - Various muscle relaxants were found to be similar in effect[32]

Systematic Review of Treatment Options: Pharmacology

- Antidepressants:
  - There is no clear evidence that antidepressants are more effective than placebo for chronic low back pain[33]
  - Tricyclic Antidepressants
    - Amitriptyline has been a 1st-line treatment in neuropathic pain for decades. The lack of supportive evidence for any beneficial effect is disappointing but has to be balance against decades of successful treatment[34]
  - Selective Serotonin Reuptake Inhibitors
    - There is little compelling evidence to support venlafaxine (SSRIs) for neuropathic pain[35] Selective Serotonin and norepinephrine reuptake inhibitors (SSNRIs)
    - Moderate evidence that high doses of duloxetine (up to 120mg) are effective to treat diabetic neuropathy and fibromyalgia to a lesser extent[36]

Systematic Review of Treatment Options: Pharmacology

- Anti-epileptics:
  - Gabapentin and pregabalin appear effective in diabetic and post-herpetic neuralgia, and pregabalin for central neuropathic (post-stroke) pain and fibromyalgia[37]
  - 3rd-tier evidence that carbamazepine is better than placebo at relieving neuropathic pain and fibromyalgia[38]
- Cannabis:
  - There is no high-quality evidence for efficacy of any cannabis product for treatment of neuropathic pain. Some current clinical guidelines consider these products as third- or fourth-line therapy for neuropathic conditions[39]
  - There is no convincing, unbiased, high quality evidence suggesting that nabilone is of value in treating fibromyalgia[40]

Systematic Review of Treatment Options: Interventions

- Trigger Point Injections (TPI):
  - Weak evidence that trigger point injections in addition to home exercises and oral medications are more effective at controlling pain symptoms than traditional therapy alone[41]
  - Limited evidence that TPI with neck stretching is more effective than neck stretching alone
  - Limited evidence that there is no difference between TPI and dry needling
  - Moderate evidence that there is no difference in safety or efficacy between Botox and Saline injectables for TPI[42]

Systematic Review of Treatment Options: Interventions

- Epidural Steroid Injections:
  - Epidural injections were associated with less short-term LEG pain and disability, but not with less BACK pain compared to placebo[43]
  - There is a fair short- and long-term benefit for treating spinal stenosis with epidural steroid injections[44]

Systematic Review of Treatment Options: Interventions

- Epidural Steroid Injections:
  - For lumbar radiculopathy, epidural steroid injections achieved a small improvement in pain intensity during the first 2 weeks compared to placebo
    - Improvement in function was inconsistent
    - Injection route had little effect on outcome
    - Steroid injections did not lower the incidence of eventual surgery
    - Outcomes for spinal stenosis were similar to those for radiculopathy[45]
  - Epidural steroid injections may provide a small surgery-sparing effect compared to control injections and reduce the need for surgery in some patients[46]

Systematic Review of Treatment Options: Interventions

- Radiofrequency ablation of joint nerves:
  - Lumbar and sacroiliac join pain
    - Significantly greater improvement in ODI scores, pain scores, and quality-of-life metrics compared to controls[47, 48]
  - Knee joint pain
    - Pain scores were lower compared to the control group at 1 week, 1 month, and 3 months
    - RF treatment significantly reduces knee pain, but rarely improves knee joint function[49]

Systematic Review of Treatment Options: Interventions

- Surgery:
  - SPORT (Spine Patient Outcomes Trial) Trial:
    - Landmark study
    - First clinical trial to try to "prove" efficacy of spine surgery for certain conditions
    - 5-year study, 2500 patients, conducted at 13 sites across the country
  - Asked: Is surgery BETTER than non-surgical treatment for:
    - Disc herniations
    - Spinal stenosis
    - Degenerative spondylolisthesis

Systematic Review of Treatment Options: Interventions

- Sport Trial Results:
  - Disc herniation: Patients in both the surgical and non-surgical arms of the study improved substantially over a 2-year period
  - Spinal Stenosis: Surgical arm showed improvement in pain, disability, and function over 2 years of follow-up compared to the nonsurgical cohort
  - Degenerative spondylolisthesis: Surgical arm showed improvement in pain, disability, and function over 2 years of follow-up compared to the nonsurgical cohort[50]
- Epidural recipients from the Non-surgical group in the SPORT trial were tracked:
  - Compared to other patients who did not receive a spinal injection, there were no differences in pain, disability, or function
  - However, results show that of those who received an epidural, significantly fewer went on to receive surgery[51]

Systematic Review of Treatment Options Interventions

- Surgery:
  - Disc herniation/prolapse:
    - Microdiscectomy is as effective as open discectomy
    - Surgical treatment for carefully selected cases appears to provide faster relief from the acute attack than non-surgical management[52]
  - Stenosis:
    - Decompression plus fusion and interspinal spacers have not been shown to be superior to conventional decompression alone[53]
    - No clear benefits were observed with surgical decompression versus non-surgical treatment
    - Rate of side-effects in surgical cases runs from 10% to 24% vs. 0% with non-surgical treatment[54]
  - Fusion:
    - Positive clinical change was greatest for spondylolisthesis (versus other indications)
    - Complications and risk of reoperation limited the benefit of fusion for spinal stenosis[55]

Systematic Review of Treatment Options: Snake oil?

- Lumbar braces:
  - Moderate evidence shows lumbar supports are not superior than doing nothing to prevent low back pain. It is unclear whether lumbar supports are more effective than no treatment to treat back pain[56]
- Shoe inserts:
  - There is insufficient evidence to support the use of insoles of foot orthoses as either a treatment or prevention of LBP[57]
- Low-level laser therapy (LLLT):
  - Moderate quality evidence to support LLLT for chronic non-specific LBP[58]
- Inversion Tables:
  - As effective as traction

Thank You!

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