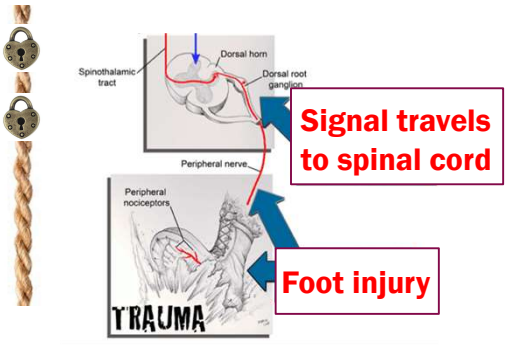
Mechanism of Pain

1

Mechanism of Pain



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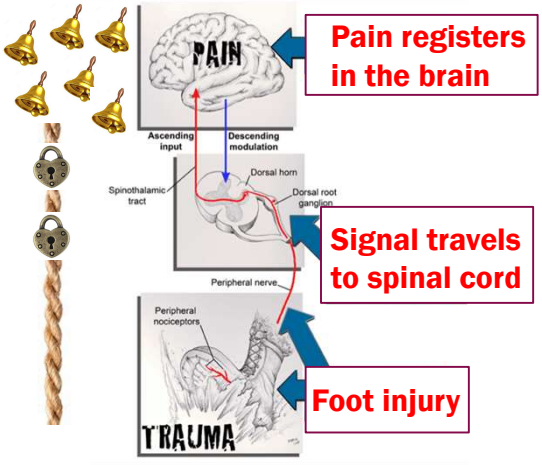
Mechanism of Pain



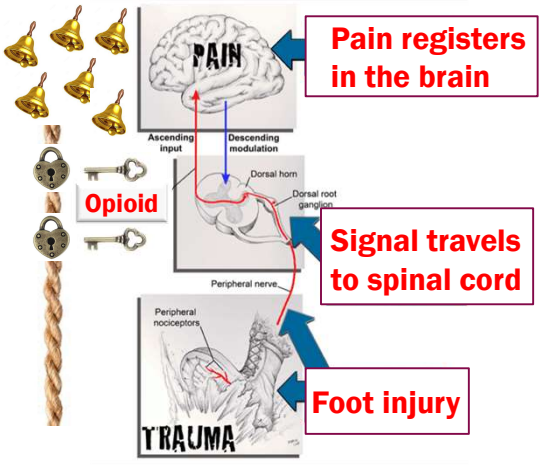
Pain registers in the brain

Signal travels to spinal cord

Foot injury

3

Mechanism of Pain



Opioid

Pain registers in the brain

Signal travels to spinal cord

Foot injury

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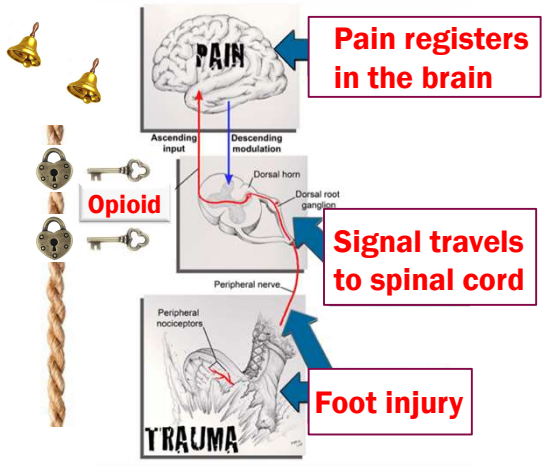
Mechanism of Pain



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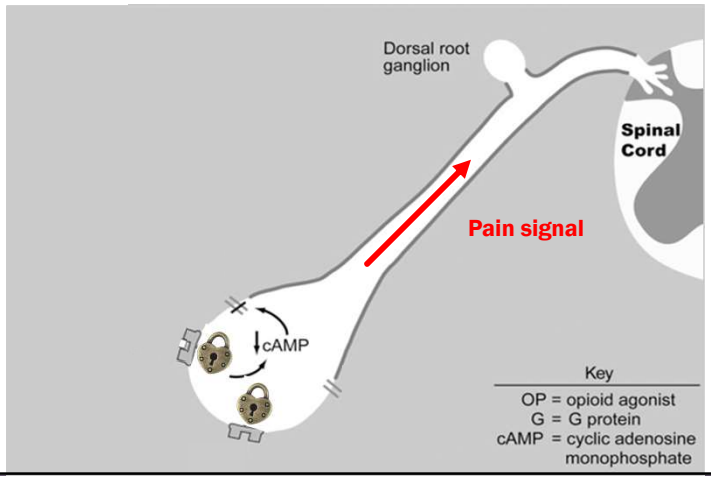
Mechanism of Pain



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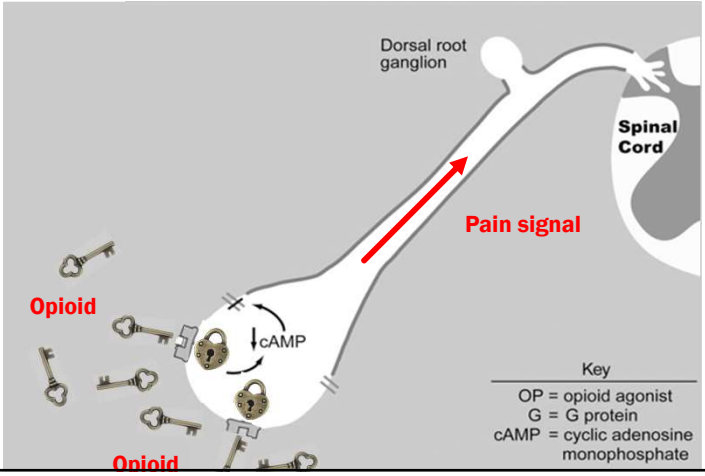
Mechanism of Pain



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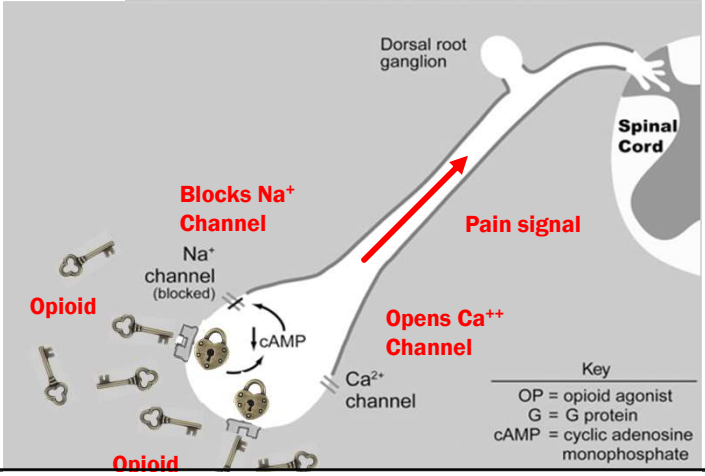
Mechanism of Pain



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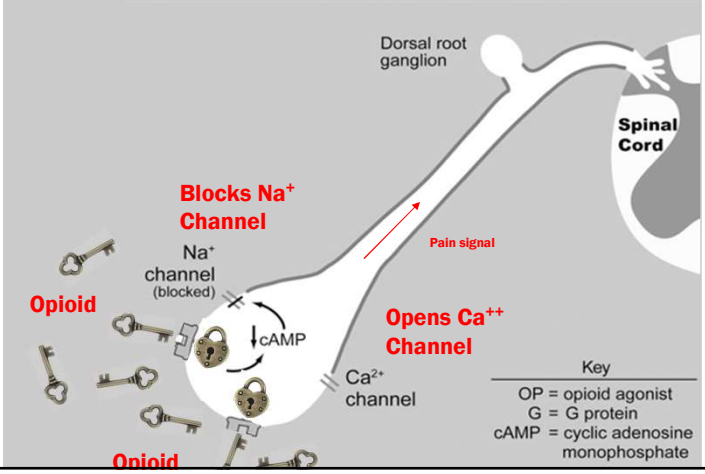
Mechanism of Pain



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Treatment of Pain with Opioids is as Old as Civilization

- Latin word for pain is poena, meaning punishment
- Albert Schweitzer: "Pain is a more terrible Lord of mankind than even death itself."
- Records show the use of opioids beginning in 2250 B.C.
- Pain is currently the major impetus behind most doctor-patient visits
- Undertreatment of pain is a major health problem worldwide

Morpheus – The God of Dreams

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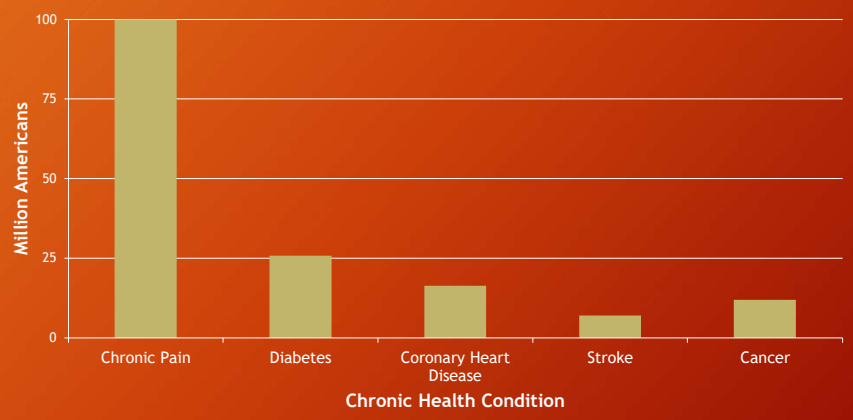
The Burden of Pain



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Differentiating the Types of Pain

- Acute pain

- Chronic pain (no physiologic markers)

- Chronic pain syndrome

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Nociceptive Pain

- Results from activation of peripheral nociceptors in response to tissue injury/trauma
- Can be thermal, chemical, or mechanical
- Tends to respond to conventional (routine) analgesics, such as NSAIDs and opioids

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Neuropathic Pain

- Most commonly develops secondary to direct nerve injury
- Presents with complaints of burning, allodynia and/or hyperesthesia
- Concomitant neural deficits often present
  - *loss of DTRs*
  - *sensory deficits*
- Tends to respond to neuromodulators
- Usually resistant to NSAIDs and opioids

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Acute vs. Chronic Pain

Acute Pain

- Usually *nociceptive* pain
- Comes on abruptly
- Self-Limiting
- Results from disease, inflammation or injury to tissues
- Most common reason to seek medical attention
- *Can become chronic pain*

Chronic Pain

- Usually *neuropathic* pain
- Physical cause but persists well beyond the normal healing period
- Persists over time
- Resistant to many medical treatments
- Present for part of each day for 6 months or more during the past year

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Neuropathic Chronic Pain Syndromes

- Diabetic neuropathy
- Complex regional pain syndrome
  - *Pain > 6 mo. most often affects one limb usually after an injury,*
- Phantom limb
- Post-herpetic neuralgia
- Central pain syndrome
  - *Can be caused by stroke, multiple sclerosis, tumors, epilepsy, brain or spinal cord trauma, or Parkinson's disease.*

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Pain Management challenges include:
(may choose more than one answer)

A. Treating what you can't always see
B. Difficult patients
C. Ease of pain management options
D. Issues of tolerance, dependence & addiction
E. Dangers of legal liability

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Challenges in Pain Management

- Treating what you can't always see
- Challenging, difficult patients
- Issues of dependence, tolerance and addiction
- Federal regulation and possible liability arising from "opioid epidemic"
- Patient advocate vs. self-protection
- Consideration of all of the "what ifs"

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Undertreatment of pain results in: (may choose more than one answer)

A. Increased clinic visits
B. Emergency department visits
C. Pseudo-addiction behavior
D. Prescription opioid abuse

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Challenges in Pain Management

- As a result, often times undertreatment occurs
  - Increased visits
  - Emergency room visits
  - Pseudo-addiction behaviors

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Importance of Effective Pain Management

- Improved patient outcomes
- Improved function and rehabilitation
- Reduced suffering
- Reduced public burden of disability
- Therefore, timely and effective management is a central component in primary care

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Goals of Pain Management Therapy

- Decreased pain
- Decreased healthcare utilization
  - *Decreased "shopping" for care*
  - *Decreased emergency room visits*
- Improved functional status
  - *Increased ability to perform activities of daily living (ADLs)*
  - *Return to employment*

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Opioid Decision-Making

- Instead of making the decision on whether to prescribe opioids based solely on diagnosis, it's more appropriate to determine whether opioids can:
  - Reduce pain
  - Improve function in valued life roles
  - Result in overall enhancement of well-being without posing unacceptable risks or side effects

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Management Begins with Assessment

- LISTEN to your patient
  - Pain is a complex, multi-dimentional experience, influenced by:
    - *Prior experiences with pain*
    - *Cultural or religious attitudes*
    - *Existential suffering*
    - *Use of analgesics*

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Management Begins with Assessment

- History to determine etiology & management
  - Provoking factors
  - Alleviating factors
  - Associated symptoms (nausea, vomiting, etc.)
  - Radiation of pain

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Management Begins with Assessment

- Description of pain will differentiate
  - Somatic pain (aching, stabbing, pressure)
  - Visceral pain (gnawing or cramping)
  - Neuropathic pain (burning, tingling, shooting)

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Pain Assessment: Ask Questions

- Questions to Ask:
  - Intensity, location, onset, duration, quality
  - Treatments tried and responses
  - Provocative and palliative factors
  - Variability in pain
  - Limitations to life

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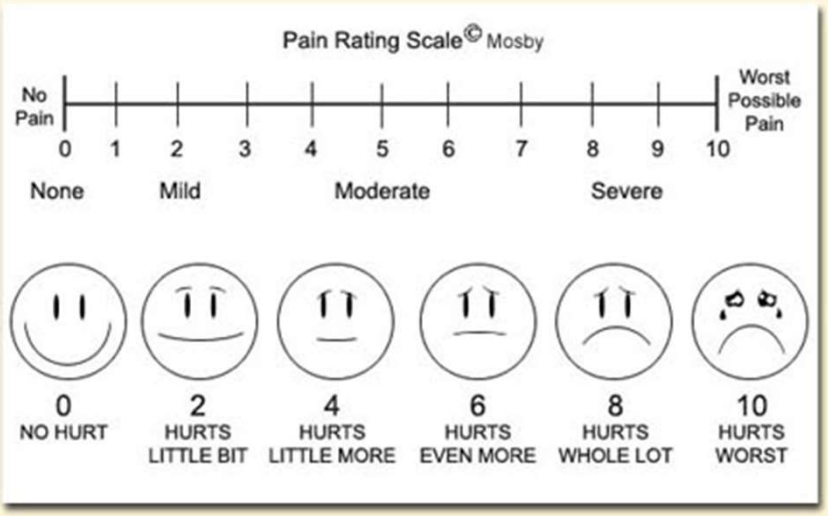
Assessment Tools



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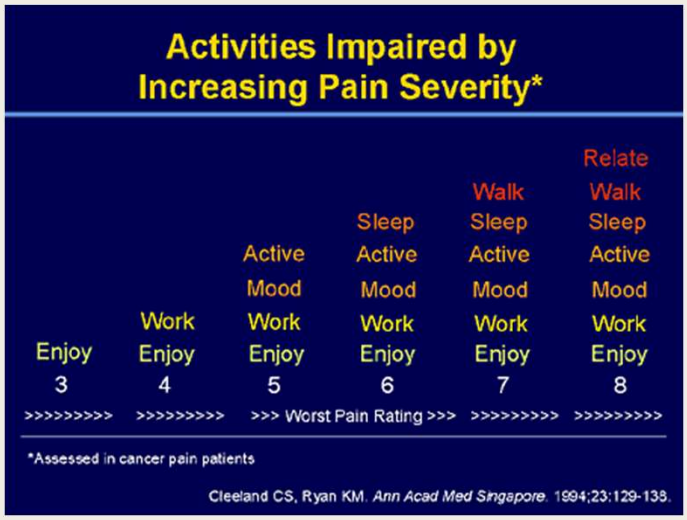
Assessment Tools



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Now What?

After making the diagnosis and decision to treat, consider:

- Nonpharmacologic interventions
- Pharmacologic interventions
- Referral

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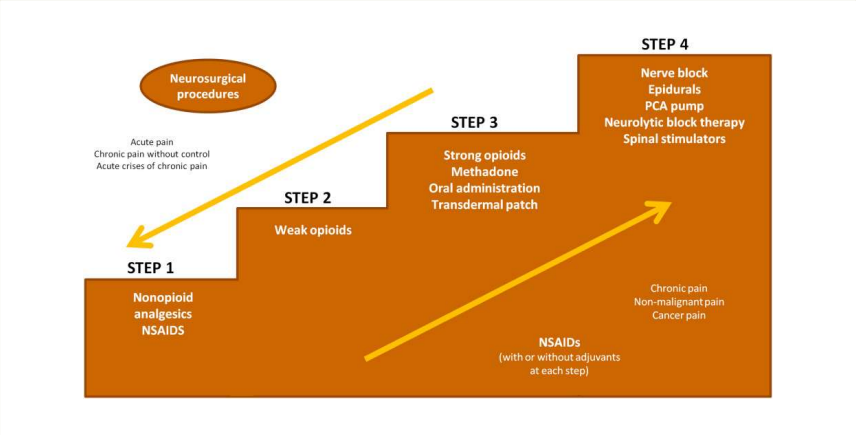
WHO Pain Management Guidelines



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CDC Pain Management Guidelines


Centers for Disease Control and Prevention

MMWR

Morbidity and Mortality Weekly Report

Early Release / Vol. 65

March 15, 2016

CDC Guideline for Prescribing Opioids for Chronic Pain — United States, 2016

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CDC Guidelines

- Guidelines created in response to "opioid epidemic"
- Developed to:
  - Provide safer, more effective care for chronic pain patients; and
  - Help reduce opioid use disorder (opioid addiction) and deaths due to opioid overdose

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CDC Guideline Treatment Principles

- Non-opioid therapy is preferred for chronic pain outside of active cancer, palliative, and end-of-life care
- When opioids are used, the lowest possible effective dosage should be prescribed to reduce risks of opioid use disorder and overdose
- Clinicians should always exercise caution when prescribing opioids and monitor all patients closely
- There are 12 CDC Guidelines

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When to Initiate Opioids for Chronic Pain

1. Opioids are not first-line therapy

Non-pharmacologic therapy and non-opioid pharmacologic therapy are preferred for chronic pain. Clinicians should consider opioid therapy only if expected benefits for both pain and function are anticipated to outweigh the risks to the patient. If opioids are used, they should be combined with nonpharmacologic therapy and non-opioid pharmacologic therapy, as appropriate.

35

Opioids compared to placebo or other treatments for chronic low-back pain (Review)

Chaparro LE, Furlan AD, Deshpande A, Mailis-Gagnon A, Atlas S, Turk DC

- Meta-analysis of 15 trials, 5540 participants
- Analysis found "… short-term efficacy (moderate for pain and small for function) of opioids to treat chronic low-back pain compared with placebo"
- Insufficient evidence to show effectiveness and safety of long-term opioid therapy for treatment of chronic low-back pain

Chaparro LE, Furlan AD, Deshpande A, Mailis-Gagnon A, Atlas S, Turk DC.. Spine (Phila Pa 1976). 2014 Apr 1;39(7):556-63

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Guideline #1 - Avoiding Opiates

Non-pharmacologic Therapy

- Physical therapy
- Exercise
- Weight reduction
- Smoking cessation
- Counseling
- Acupuncture
- Mindfulness

Non-Opioid Pharmacologic Therapy

- Acetaminophen or NSAIDS
- Topical medication
- Muscle relaxants
- Antidepressants
- Anticonvulsants
- Medical marijuana
- Interventional pain practices

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Non-Pharmacologic Interventions

- Physical therapy
- Exercise
- Weight reduction
- Counseling
- Smoking cessation

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Physical Therapy

- Passive modalities used in moderation
- Stretch, strengthen, condition, ROM
- Functional outcomes emphasized over pain reduction
- Goal should be to make the patient independent in a maintenance exercise program

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Weight Reduction

- If BMI >25:
  - *Increased incidence osteoarthritis*
  - *Increased risk of low back pain*
- Gaining 10 pounds of body weight:
  - *Feels like a 30-pound weight gain for your knees*
  - *When climbing stairs, feels more like 70 pounds to your knee joint*

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Consider Counseling

- Psychological history
- Coping styles
- Pain score and descriptors
- Patient goals
- Pending litigation
- Past history of trauma or abuse
- Comorbid depression and anxiety

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Smoking and Pain

Smokers have:

- Higher rates of pain
- Higher intensity of pain
- Increased incidence of disk disease
- Higher rates of osteoporosis and degenerative joint disease
- More social and occupational impairment
- Reduced tolerance for pain

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Guideline #1 - Avoiding Opiates

Non-pharmacologic Therapy

- Physical therapy
- Exercise
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- Smoking cessation
- Counseling
- Acupuncture
- Mindfulness

Non-Opioid Pharmacologic Therapy

- Acetaminophen or NSAIDS
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Non-Opioid Pharmacologic Therapy

- Acetaminophen or NSAIDS
- Topical medications
- Muscle relaxants
- Antidepressants
- Anticonvulsants
- Medical marijuana
- Interventional pain practices

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NSAIDS

- Effective for a wide variety of pain syndromes
- Most useful for pain of 2-5 intensity
- OTC and prescription (nabumetone/meloxicam)
- Risks with gastroesophageal reflux disease, bleeding, hypertension and overuse
- Significant toxicities associated with long-term use

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1.Ketoralac

- Toradol
- NSAID for moderate to severe pain
- 30 mg/ml, IV push or IM q6hr; not to exceed 120 mg/day.
- 5-day treatment
- Risk of gastrointestinal (GI) bleeding.
- More cost-effective than IV morphine.
- Not be used for mild or long-term painful conditions.

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2.Ibuprofen

- NSAID for moderate to severe pain Monotherapy or in combination with opioids
- IV ibuprofen is 400 mg to 800 mg every 6 hours as necessary with a maximum of 3200 mg per day
- No limit on duration of use
- Contraindicated in the setting of CABG surgery

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3.Diclofenac sodium

- Voltaren
- NSAID for moderate to severe pain
- Monotherapy or in combination w/opioid
- 37.5 mg IV bolus injection infused over 15 seconds q6hr as needed, not to exceed 150 mg/day.
- Short duration
- Patients must be well hydrated prior to IV administration

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4.Parecoxib sodium

- Dynastat
- first parenteral COX-2 inhibitor
- 20 and 40 mg, IV or IM
- similar to that of Ketorolac, 15 to 30 mg IV and 30 to 60 mg IM, and
- similar to IV morphine 12 mg.
- It has an additive effect with morphine.

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5.Acetaminophen

- Tylenol
- approved in 2010 by the FDA for intravenous use for moderate to severe pain, with adjuncts
- IV dose for patients >50 kg (110 lbs) is 1000 mg q6h, or 650 mg q4h.
- most common side effects - constipation, nausea, injection site pain, pruritus, and vomiting.
- >4000mg/d – severe hepatic injury

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6.Ketamine

- nonbarbiturate general anesthetic
- procedural sedation and rapid sequence intubation
- Peak effect in minutes
- Typical duration of 10–15 minutes.
- After 15-20 mg IV ketamine, may be followed immediately by continuous ketamine infusion at 20 mg/h for 1 hour for severe pain.

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7.Dextromethorphan IV

- N-methyl-D-aspartate (NMDA) receptor antagonist.
- non-controlled drug, structurally related to the opiate codeine, with which it shares its antitussive properties.
- When used perioperatively, it reduces postoperative opioid consumption.
- Side effects; and deaths

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8.Lidocaine IV

- Useful acute pain adjunct
- Enhanced recovery after surgery.
- Anti-inflammatory, anti-hyperalgesic, and gastrointestinal pro-peristaltic drug.
- Acute hyperalgesia particular benefit.
- i.v. lidocaine 1–2 mg kg−1 as an initial bolus followed by a continuous infusion of 0.5–3 mg kg−1 h−1.

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9.Liposomal Bupivicaine

- Exparel
- long-acting local anesthetic used to produce local analgesia for pre- or post-operative pain control for specific nerve blocks.
- It inhibits nerve impulse initiations and conduction by inhibiting sodium ion channels
- Prolong the time to first opioid use after surgery by 14 hours.

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Topical Medications

- Lidoderm patch (Lidocaine cream)
- Diclofenac (Flector, Voltaren gel)
- Compounded creams
- Advantages and limitations

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Muscle Relaxants

- Reduce spasms
- Act centrally and not locally (sedation)
- Cyclobenzaprine (Flexeril)
- Tizandine (Zanaflex)
- Baclofen
- Carisoprodol (SOMA)
- Diazepam (Valium)
- Caution with SOMA and diazepam

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Antidepressants

- Older classes of antidepressants most effective
  - *(TCAs like amitriptylline and nortriptylline)*
- Increase the central nervous system's production of endogenous painkillers
- Improve sleep hygiene, decrease anxiety and depression
- Start with 10 mg or 25 mg at HS and increase weekly as tolerated to minimize side effects
- Cardiac risk and poor safety profile

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Notes on Antidepressants

- SSRIs do not treat pain
- SSRI do treat depression and anxiety
- Often you can't treat chronic pain without treating the accompanying depression and anxiety
- Consider referral to counseling

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Neuromodulators

- Effective for neuropathic pain syndromes
- Newer agents have improved side effect and toxicity profiles (vs. tricyclic antidepressants)
- Gabapentin, duloxetine, pregabalin, milnacipran

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Interventional Pain Practices

- Able to offer medication management, as well as interventional techniques to treat pain and its causes
- Specialists may include anesthesiologists, physical medicine and rehabilitation specialists and physiatrists (should be comprehensive)

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Pain Management Treatments

- Trigger point injections
- Back pain
  - *Epidural steroid injections*
  - *facet blocks/denervation*
- Headache
  - *C2 and occipital nerve block*
- Pelvic/abdominal pain
  - *Celiac plexus and hypogastric nerve blocks*
- Neuromodulation (spinal cord stimulation)
- Intrathecal drug delivery

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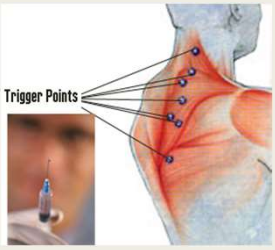
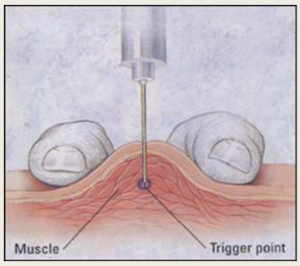
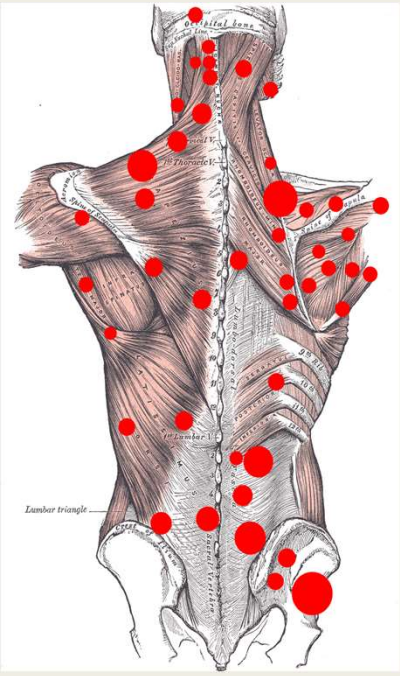
Trigger Point Injections







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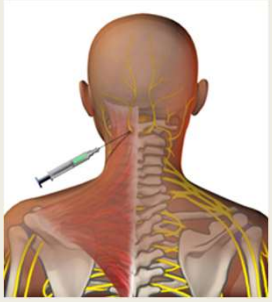
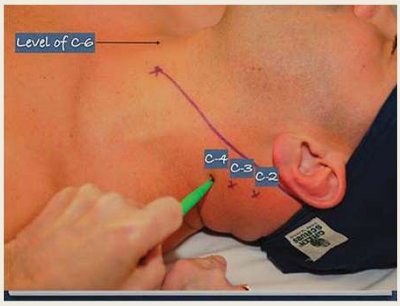
Occipital & C2 Nerve Root Blocks for Headache





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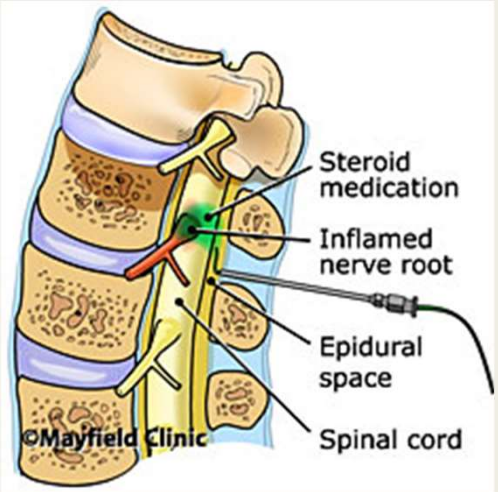
Epidural Steroid Injections



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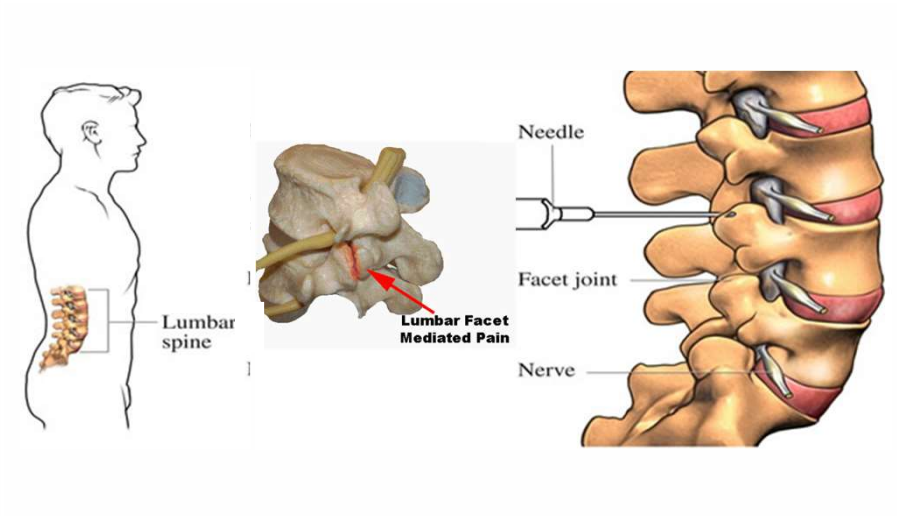
Facet Joint Injections



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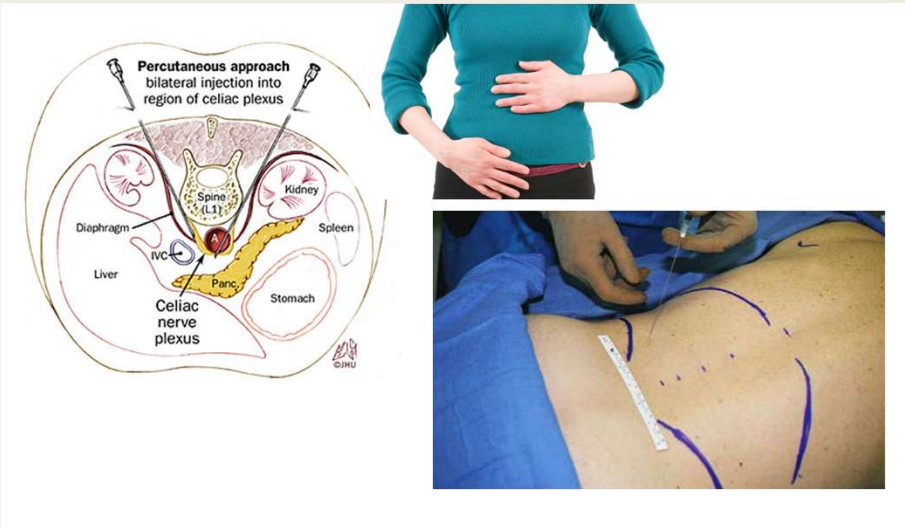
Celiac Plexus & Hypogastric Blocks



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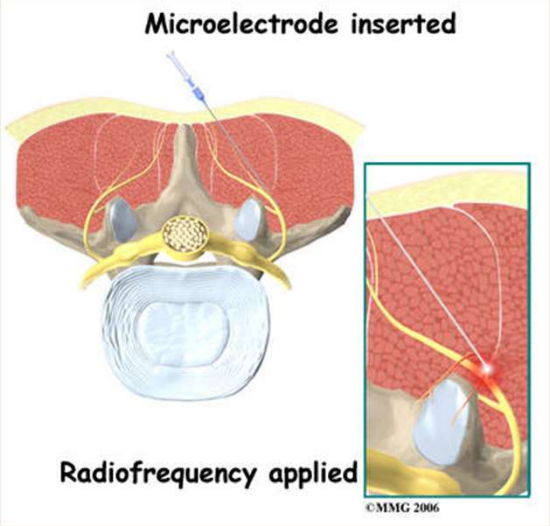
Radiofrequency Denervation



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Spinal Cord Stimulators

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Intrathecal Drug Delivery

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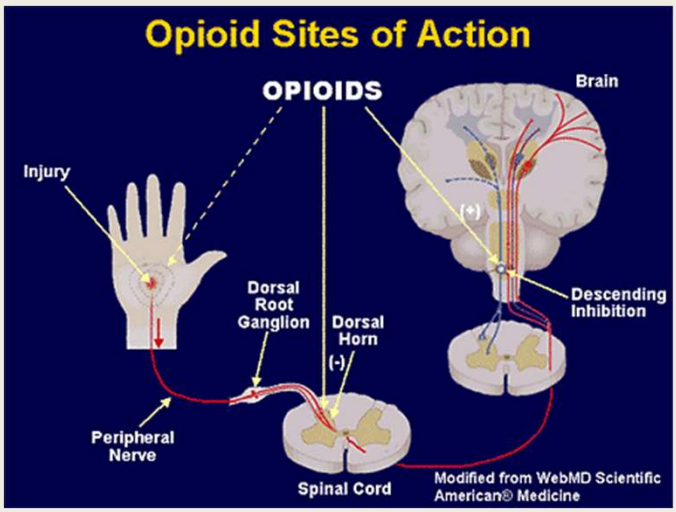
Consider Opioids for Pain > Five



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