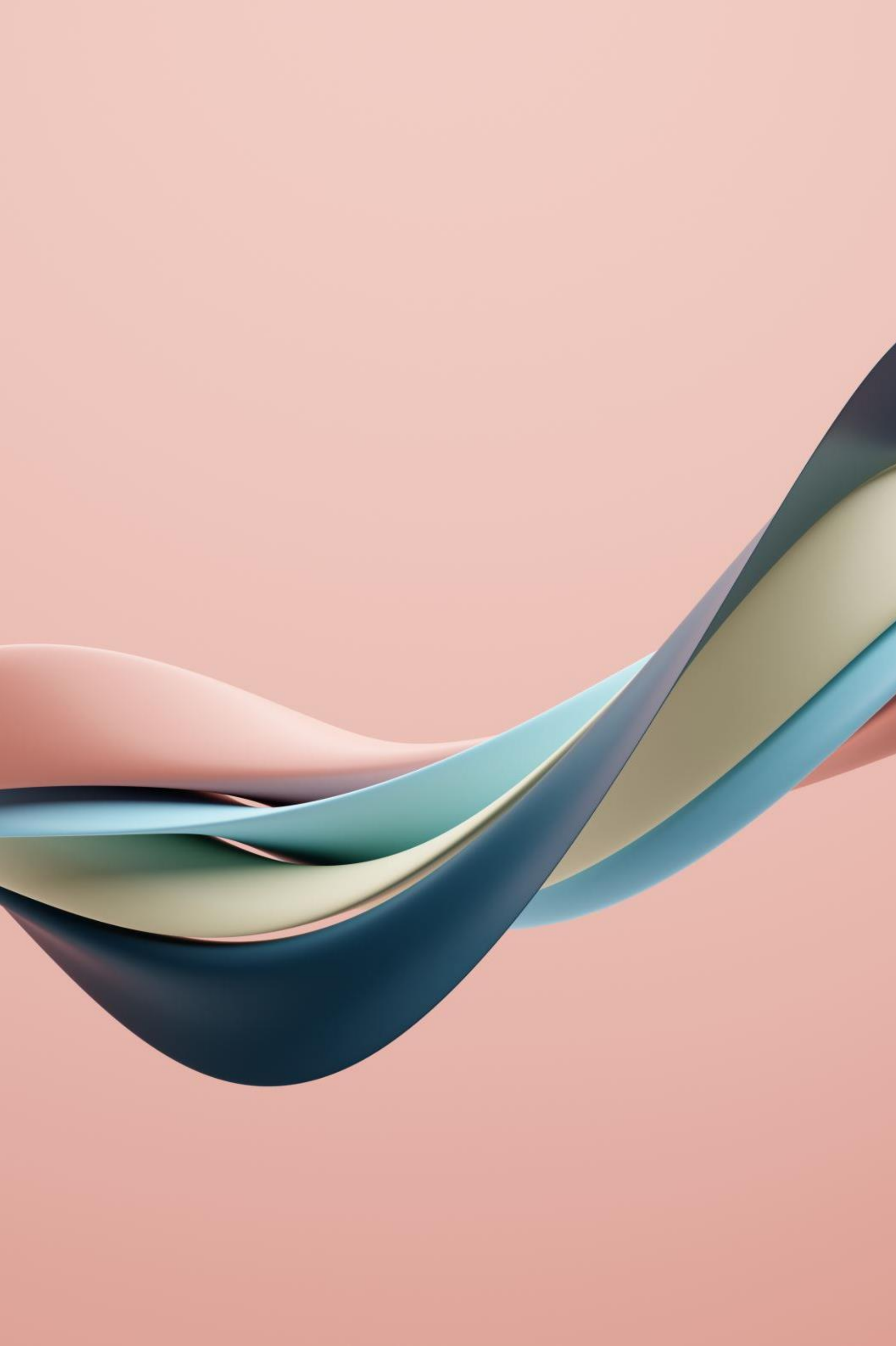


FEELING ALRIGHT PART 2

PAIN MANAGEMENT OF ORTHOPEDIC PATIENTS

DISCLOSURES

- I have no personal, financial or commercial relationships or messages to disclose. All relevant financial relationships have been mitigated.

THE MENU

- PDMP (prescription drug monitoring program)
- Management of orthopedic pain with opioids
- Buprenorphine management
- Post operative pain management
- Pharmacologic management with non-opioids
- Serotonin Syndrome
- Tramadol
- Case studies
- Questions

PRESCRIPTION DRUG MONITORING PROGRAM (PDMP)

What is it?

State-run prescription monitoring system to track schedule II-IV/V prescription drugs, in an effort to monitor and reduce the prescribing of potentially dangerous medications, such as opioids (eg. Oxycodone) and benzodiazepines (eg. Alprazolam), that are very often abused or diverted.

CDC SAYS

Most promising state-level intervention to

- Improve prescribing
- Inform clinical practice
- Protect patients

Check the PDMP

- Any time you prescribe an opioid.

CDC, 2017

HOW TO JOIN THE PDMP

Go to the PDMP website for your state and sign up

→

Access to all prescriptions for a patient in the last 24 months

→

Assign your head assistant to be a delegate under your license

- They have access to look up for you and prep all your charts so you can be aware.
- Some states require a minimal level of LPN to have access.

HELPFUL RESOURCES

- CDC's opioid guideline app. (CDC, 2019) https://www.cdc.gov/drugoverdose/prescribing/app.html
- Society of health system pharmacist's *Guidelines of preventing diversion of controlled substances.* (ASHP, 2017). https://www.ashp.org/-/media/assets/policy-guidelines/docs/guidelines/preventing-diversion-of-controlled-substances.ashx
- Mandated education through the Substance Abuse and Mental Health Services Administration (SAMHSA).
- Joining the PDMP.
- Morphine Equivalency Chart and Calculator.
  - Chart—https://www.cdc.gov/drugoverdose/pdf/calculating_total_daily_dose-a.pdf
  - Calculator—https://www.cdc.gov/drugoverdose/prescribing/app.html

CDC, 2017 and 2020

OPIOID FACTS

1999-2017: 400,000 died from an opioid overdose.

130 lives/day

$78 billion/year

50% of users get them from friend/family with extra

90% of the 60 million patients prescribed an opioid in 2017 did not use the entire prescription.

As recently as 2011 80% of American medical schools had no formal pain management education. Still lacking in other provider programs (NP, CRNA, PA).

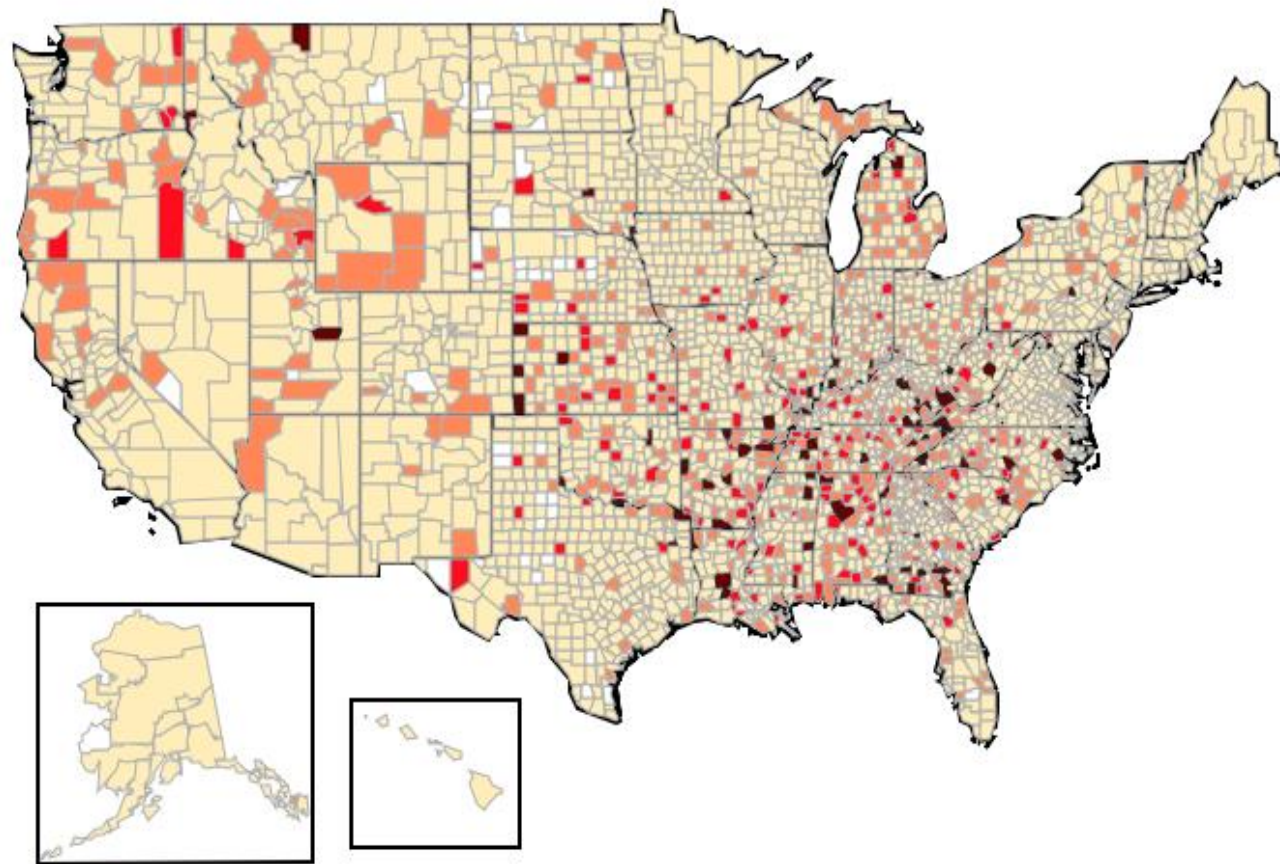
Education Currently much improved

1. CDC, 2019
2. US Facts, 2020
3. Heath, 2019

U.S. County Opioid Dispensing Rates, 2019

< U.S. County Opioid Dispensing Rates, 2018

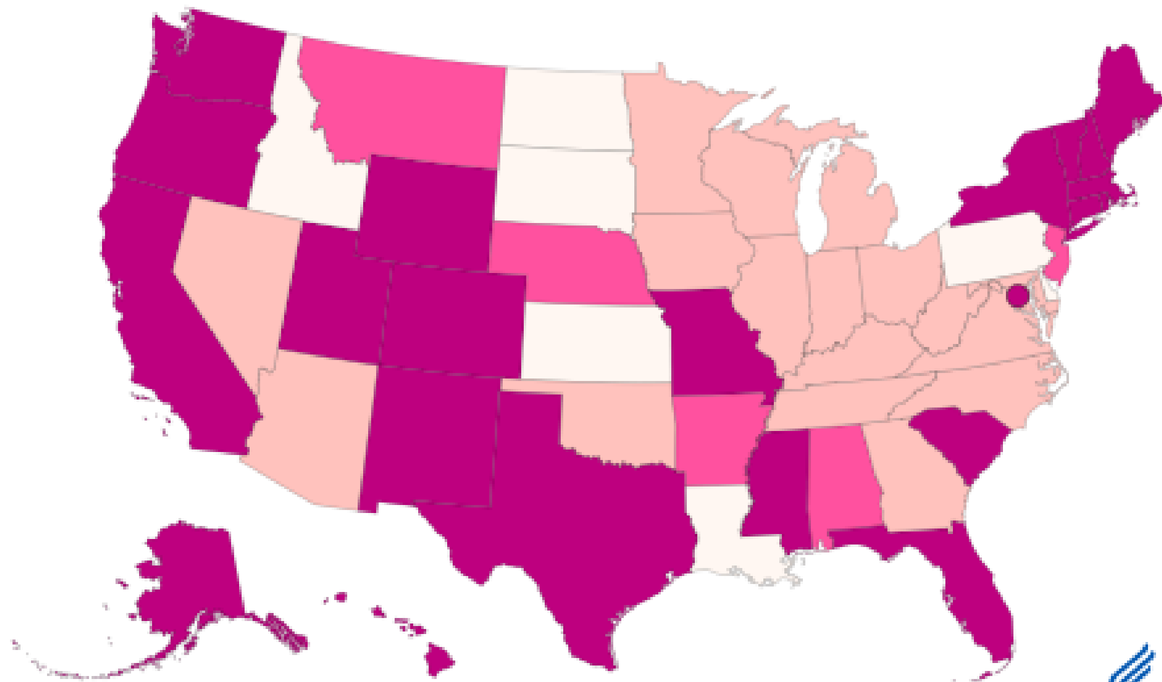
U.S. Opioid Dispensing Rate Maps

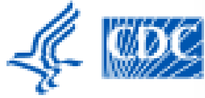


CDC, 2019

2017-2018 Overdose Map

Statistically significant changes in drug overdose death rates involving prescription opioids by select states, United States, 2017 to 2018





Did not meet inclusion criteria

Decrease

Did not meet inclusion critiera

Stable-not significant

MORPHINE EQUIVALENCIES

- Know your morphine equivalencies
  - Buprenorphine 1mg=1mg MS (Morphine Sulfate) (dosed in mcg)
  - 10mg tramadol=1mg MS
  - 10mg Demerol=1mg MS
  - 1mg hydrocodone=1mg MS
  - 1mg oxycodone=1.5mg MS
  - 1mg hydromorphone=4mg MS
  - 1mg fentanyl=2400mg MS (dosed in mcg)
  - Opioid conversion calculator-- https://www.oregonpainguidance.org/opioidmedcalculator/

OPIOID PRESCRIBING

- Daily dosing of 50MME or less with continual reassessing
- Very careful consideration for increasing to 90MME or higher

Morphine equivalency math

- Hydrocodone/acetaminophen 10/325 1-2 PO TID = 30-60
- Oxycodone/acetaminophen 10/325 1-2 PO TID= 45-90
- Morphine 15mg 1-2 PO TID= 45-90
- Hydromorphone 2mg 1-2 PO TID= 24-48
- Fentanyl 25mcg Q 48-72 hrs= 60

CDC, 2021

BUPRENORPHINE

- A medication approved by the FDA to treat opioid use disorder (OUD).
- Pain management in certain formulations (FDA approved)
- Partial opioid agonist with significantly weakened side effects in comparison to full opioid agonists such as Oxycodone, Fentanyl, Methadone, etc.
- Diminished effects of physical dependency
- Decreased side effects
- Increased safety in case of overdose
- Lower potential for misuse.
- Very low Morphine equivalency.

- SAMHSA, 2020

BUPRENORPHINE

- Forms of Delivery
  - Buprenorphine/Naloxone sublingual tablets (Zubsolv)
  - Buprenorphine sublingual tablets (Subutex)
  - Buprenorphine/Naloxone sublingual film (Suboxone)
  - Buprenorphine transdermal patch (Butrans)
  - Buprenorphine/Naloxone buccal film (Bunavil)
  - Buprenorphine buccal film (Belbuca)
  - Buprenorphine extended-release injection (Sublocade).

BUPRENORPHINE

- Who?
  - Patients in specialty care
    - Recovering addicts
    - Opioid use disorder
    - Chronic pain management
    - ETOH abuse disorder

  - DO NOT!!
    - Prescribe any narcotic prior to consulting the prescriber of the buprenorphine.
    - Stop the medication.

NSAIDS AND STEROIDS

NSAIDS
Nonsteroidal anti-inflammatory drugs

- Ibuprofen—400-600mg TID-QID—Do not exceed 3200/day but only for short periods
- Naproxen—500mg BID is prescription for acute issues.
- Meloxicam—7.5mg BID or 15mg QD
- Celecoxib—200mg BID for 1 week then 200mg QD

Corticosteroids

- Solumedrol taper—4mg 1PO six times per day (day 1) tapering down to QD (day 6)
- Prednisone 10mg taper—40mg PO x 3 days, 30mg PO x 3 days, 20mgPO x 3 days, 10mg PO x 3 days

NEUROGENIC/PSYCHOGENIC

- Neurogenic
  - Gabapentin (Neurontin)
    - 300mg PO titrating to TID up to 900-1200mg (max 3600mg)
  - Pregabalin (Lyrica)
    - 75mg PO titrating to TID up to 200mg (max 600mg)
  - Gabapentin ER (Gralise)
    - 1800mg QHS (fixed dose)

- Psychogenic
  - Duloxetine/Cymbalta (SNRI)
    - 30mg QHS titrating to a max 120mg/day
  - Venlafaxine/Effexor (SNRI)
    - 37.5mg/day x 7 days then 75mg/day.
      - Increase by 75mg/day q7 days to a max 225mg

MUSCLE RELAXERS

- **Muscle Relaxers**
  - Cyclobenzaprine (Flexeril)
    - 5-10mg 1PO BID-TID
  - Baclofen (Ozobax)
    - 5-20mg 1PO BID-TID
  - Metaxalone (Skelaxin)
    - 640-800mg 1PO BID-TID
  - Methocarbamol (Robaxin)
    - 500-750mg 1PO BID-QID
  - Tizanidine (Zanaflex)
    - 1-2mg 1PO BID-TID
  - Carisoprodol (Soma) (not recommended to prescribe)

POST OP & ACUTE/FX DOSING

NSAIDS

- Ibuprofen
- 400-800mg PO Q 6 hours not to exceed 3200mg daily (Ask about Renal function/Gastric Ulcers)

Acetaminophen 500mg

- 1-2 PO not to exceed 4000mg daily. (Ask about liver or ETOH use)

Opioids

- Tramadol
  - 50mg 1-2 PO QID
- Norco (5mg Hydrocodone /325mg Acetaminophen)
  - 1-2 PO Q4-6 hours
- Oxycodone 5mg
  - 1-2 PO QID

Moore et al, 2018

POST OP

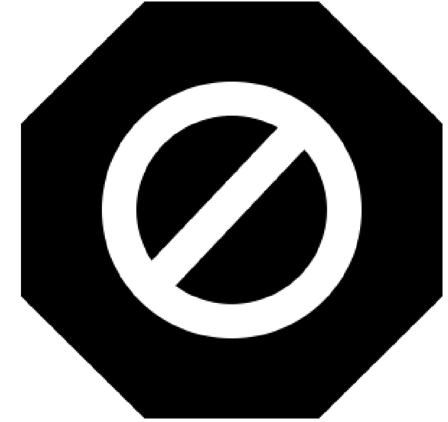
- Top medication combinations with the lowest dose needed to treat for benefit:
  - 400mg ibuprofen/1000mg acetaminophen
  - 200mg ibuprofen/500mg acetaminophen
  - 1000mg acetaminophen/10mg oxycodone
  - 100mg diclofenac
- Combinations leading to at least 50% pain relief for 4-6 hours
  - 600mg ibuprofen
  - 400mg ibuprofen + 1000mg acetaminophen
  - 200mg ibuprofen + 500mg acetaminophen

Moore et al, 2018

- Neuropathic pain, severe muscle spasms, other comorbidities
  - Determine etiology or unmentioned history
  - Refer back to the surgeon or even Pain management
- Refer if you are not well versed in appropriate pain management techniques.
- Acute vs. Chronic pain management
- Many medications in combination with opioids have a negative synergistic effect leading to dangerous outcomes.

WARNING

- Polypharmacy
  - Increased risk of addiction
  - Increased respiratory depression
  - Increased risk of complications
- Benzodiazepines (>30% of opioid ODs involve benzos) NIH, 2018
  - alprazolam, lorazepam, Diazepam, Clonazepam
- Muscle Relaxers
  - Cyclobenzaprine, Carisoprodol, Metaxalone, Methocarbamol, Tizanidine
- Prescription Stimulants
  - Adderal, Ritalin, Vyvanse
- Dopamine Reuptake Inhibitor
  - Modafinil



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SEROTONIN SYNDROME—WHAT IS IT?

- Serotonin syndrome (ie, serotonin toxicity)
  - A potentially life-threatening condition associated with increased serotonergic activity in the central nervous system (CNS). It is seen with therapeutic medication use, inadvertent interactions between drugs, and intentional self-poisoning.

Ochsner, 2013

SEROTONIN SYNDROME—SYMPTOMS

Symptom range: barely perceptible to life threatening

Diagnosed clinically best by **Hunter Criteria**

1. History of exposure to a serotonergic drug plus
2. One or more of the following:
   1. Spontaneous clonus
   2. Inducible clonus with agitation and diaphoresis
   3. Ocular clonus with agitation and diaphoresis
   4. Tremor and hyperreflexia
   5. Hypertonia
   6. Temperature >38 C with ocular or inducible clonus

SEROTONIN SYNDROME—SYMPTOMS

Subtle symptoms:

- restlessness,
- minor tremors,
- GI distress
  - Can be confused with underlying psych disorders or other medication side effects

Serious Symptoms:

- malignant hyperthermia,
- anticholinergic toxicity,
- sympathomimetic toxicity, or infectious causes such as meningitis or encephalitis
  - Can be confused with Neuroleptic Malignant Syndrome

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SEROTONIN SYNDROME—INCIDENCE

- Good news:
  - Many studies and literature reviews discuss even though it is difficult to determine: the incidence of serotonin syndrome is very low.
  - Unknown mostly due to overlooked or minor cases though most sources show an incidence of < 1%
  - The clinical incidence of serotonin syndrome has been estimated to be anywhere from 0.18% (1.8/1000) to 0.57% (5.7/1000).
  - Most cases are not serious and can easily be reversed.

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1. Karkow et al, 2017

SEROTONIN SYNDROME—MEDS TO WATCH

- Selective Serotonin Reuptake Inhibitors (SSRI)—Citalopram (Celexa), Fluoxetine (Prozac), Fluvoxamine/Paroxetine (Paxil), Sertraline (Zoloft).
- Serotonin and Norepinephrine Reuptake Inhibitors (SNRI)--Duloxetine (Cymbalta), Venlafaxine (Effexor)
- Tricyclic Antidepressants—Amitriptyline and Nortriptyline
- Monoamine Oxidase Inhibitors (MAOI)—Isocarboxazid (Marplan) and Phenelzine (Nardil)
- Lithium

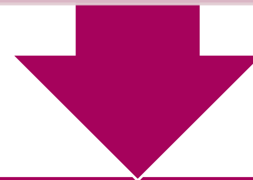
SEROTONIN SYNDROME—MEDS TO WATCH

- Migraine Meds—Carbamazepine (Tegretol), Valproic Acid (Depakene), and Triptans (Imitrex, Amerge, Maxalt).
- Pain Meds—Codeine, Fentanyl, Hydrocodone, Oxycodone, Tramadol
- Illicit drugs—LSD, Ecstasy, Cocaine, Meth
- OTC medications containing dextromethorphan
- Anti-nausea meds—Ondansetron (Zofran), Metoclopramide (Reglan)
- Linezolid (Zyvox)
- Ritonavir (Norvir)

SEROTONIN SYNDROME—MANAGEMENT

Five principles are central to the management of serotonin syndrome:

- D/C all serotonergic agents
- Supportive care aimed at normalization of vitals
- Sedation with benzos
- Admin of serotonin antagonists
- Assessment of resuming serotonergic agent after symptom resolution



Symptoms usually resolve in 24 hours

Boyer, 2020

TRAMADOL AND SEROTONIN SYNDROME

- Tramadol—partial opioid agonist with SNRI properties.
- Prescribing
  - 50mg 1-2 PO BID-QID. (400mg max recommended daily dose)
  - Ideally 50mg 1 PO BID-TID
- Often linked to increased risk of serotonin syndrome.

TRAMADOL STATS

- 2015-21
  - Over **200 million tramadol** prescriptions
- Serotonin syndrome (1997-2017)
  - **968** serious cases were reported to the FDA and **98** resulted in fatality.
- Contraindicated with MAOIs or w/in 14 days of stopping MAOIs. (Rarely prescribed)
- 5% who OD'd with a mean dose of **1481mg** (400mg daily max dose) experienced serotonin syndrome.
- Tramadol related seizures (1997-2017)
  - **2019** seizures and **145** deaths related to tramadol.
    - Mean seizure dose was **3200mg** (seizure threshold dose is 100-500mg)

1. Hassamai et al, 2018
2. Reines et al, 2020
3. DEA, 2023

TRAMADOL TAKEAWAY

- Okay to prescribe
- Safer than alternatives
  - Hydrocodone
  - Oxycodone
  - Morphine
  - Fentanyl
- Less risk of addiction
- Relatively low morphine equivalency
- For OA patients who cannot take NSAIDS or Acetaminophen

CASE STUDY 1

47 yo female

Ankle sprain with negative radiographs

The patient reports taking suboxone

You offer NSAIDS and Tylenol for post op pain.

“I really do best with oxycodone!”

What to do?

- Check the PDMP
- Contact whomever provides their suboxone
- Be honest with the patient regarding the situation

CASE STUDY 2

- 14 yo female
- Non-op wrist fracture
- Scripts
  - 5 norco (hydrocodone/Tylenol) 5/325, Ibuprofen 600-mg
- Mom calling requesting something stronger than norco
- Call them in for a follow up to determine patient situation
- Check the PDMP for the daughter as that might indicate parental opioid diversion.
  - Frequent opioid fills
  - Multiple providers
- Contact Pediatrician
- Not common but catching this can make a huge difference

Stock image obtained through Microsoft PowerPoint

CASE STUDY 3

58 yo Male

- 1 week s/p Right THA
  - C/O pain that is worse than before surgery.

Exam

- Mild pain with ROM and strength testing
- Incision
  - Clean, dry, intact, no S&S of infection
- Right lower extremity
  - Warm, dry, and pedal pulses present and brisk

Imaging

- A/P pelvis with a lateral view of the right hip.
  - No acute fracture, dislocation, bony abnormalities. The prosthesis is intact, in place, and consistent with post operative imaging.

CASE STUDY 3 CONT.

Post op meds

- Oxycodone 10mg 1 PO QID PRN for post operative pain
- Celebrex 200mg 1 PO QD
- ASA 325mg 1 PO QD

Next step?

- Double dosing of opioid medications?
- Look for other potential sources of pain
  - Unseen infection
  - Stress fracture
- Determine what type of pain the patient is having?
  - Neurogenic pain?
- Advanced imaging?

THANK YOU

Questions????

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