




# PAIN MANAGEMENT

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# Objectives

- Distinguish the differences between acute pain, acute on chronic pain and chronic pain
- Know the opioid equivalents and how to convert from one opioid entity to another
- Understand how specific opioid characteristics and relative potencies play a role in opioid selection
- Recognize appropriate doses and dosing intervals for the most common IV and oral opioids
- Discuss how all of this information can help you avoid under or over-dosing
- Familiarize yourself with non-opioid adjunct therapies for pain
- Review recent requirements for opioid prescribing

# Definitions

- Acute pain
  - Occurs following tissue injury and inflammation (well-defined onset)
  - Serves an adaptive (protective) function
  - Etiology is usually nociceptive or inflammatory
  - Dissipates with healing
  - Usually responds well to analgesics and anti-inflammatories
  - Duration of less than 30 days
- Chronic (persistent) pain
  - Pain whose duration outlasts the expected duration of tissue healing
  - Usually does not serve any adaptive function
  - Etiology can be inflammatory, neuropathic or dysfunctional (central sensitization)
  - Can be difficult to treat **and treatment should rarely consist of an opioid alone**
  - Often classified as lasting more than 90 days
  - Additional behavioral and functional modification add insult to injury

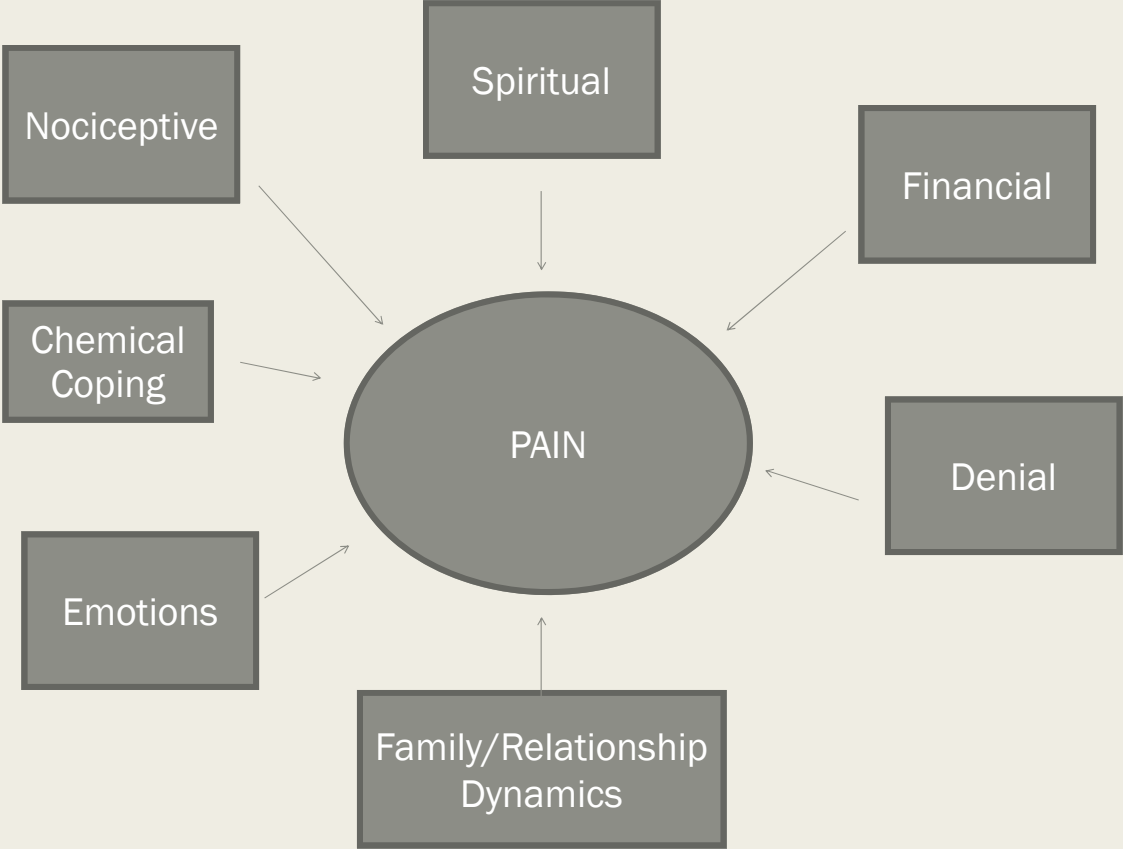
# Definitions

- Acute on chronic pain
  - Acute injury in someone with chronic pain (acute post-op pain after a MVA in a patient with chronic back pain)
  - Opioid tolerance may come into play
- Total Pain
  - Emphasizes the totality of a patient's experience in the context of their illness and/or dying

# Vicious Cycle of Chronic Pain

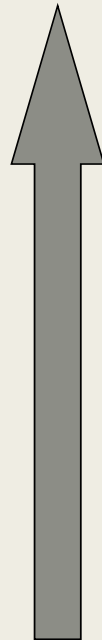


# Total Pain



# Relative Potency

- Fentanyl
- Methadone
- Hydromorphone
- Oxycodone
- Morphine
- Codeine
- Hydrocodone



Most Potent

Least Potent

# Opioid Conversion Table

(excludes dosing for fentanyl patch)

| Opioid        | IM/IV (mg)   | PO (mg) |
|---------------|--|---------|
| Morphine      | 10   | 30      |
| Hydromorphone | 1.5  | 7.5     |
| Fentanyl      | 0.1  | n/a     |
| Oxycodone     | n/a  | 20      |
| Hydrocodone   | n/a  | 30      |
| Methadone     | Consult a provider with experience in methadone dosing |         |



# Converting from One Opioid Entity to Another

- Pick alternate opioid based on desirable opioid characteristics and patient's pain description
- Use opioid conversion ratios you are familiar with and comfortable with
  - *keep relative potencies in mind when converting*
- Account for incomplete cross tolerance in your calculations

# Patient Case

- MG is taking MSContin 60mg PO q 8 hours chronically. Pt takes 4 to 6 percocet (5/325mg) per day on average for breakthrough pain and takes 2 tablets per dose. Their medical condition results in the patient having acute on chronic pain and requires the patient be made NPO including all medications. How do you proceed with their care from a symptom perspective?
- PCA?
- IV opioid prn by RN administration?
- Combination of the two?

# Calculations

- 180 mg PO morphine daily via MSContin
  - *PO:IV conversion is 3:1*
  - *180 mg PO = 60 mg IV morphine*
- 4 Percocet per day = 20 mg oxycodone
  - *Oxycodone to morphine conversion 1.5:1*
  - *20 mg x 1.5 = 30 mg PO morphine equivalent at 100% conversion*
  - *30 x 60% = 18 mg PO morphine*
    - *PO:IV morphine conversion 3:1*
    - *18 mg ÷ 3 = 6mg IV morphine equivalent daily in prn opioid*
- 60 mg IV + 6 mg IV = 66 mg IV morphine equivalent in 24 hours
  - *By RN push: 66 ÷ 12 (if dosed every 2 hrs prn) = ~ 6mg IV per dose*
  - *Via PCA*
    - *66mg IV morphine/24 hours = 2.75 mg per hour to provide chronic basal opioid*

# Break through dosing

- 60 mg IV morphine per day baseline (scheduled opioid)
- $60 \times 10\% = 6 \text{ mg IV}$
- 2 Percocet per dose = 10 mg oxycodone
  - *10mg oxycodone = 15 mg PO morphine (60%) = 9 mg*
  - *9 mg PO morphine = 3 mg IV morphine*
- PCA: morphine 3mg/hr basal with 4mg Q 30 minutes on demand and 4mg Q 2 hour prn by RN bolus. No 4-hr lockout

# Characteristics of Opioids

| Opioid        | Bioavailability Of Oral Therapy (%) | Active Metabolite  | Metabolism                 | Primary Route of Elimination |
|---------------|-------------------------------------|--|----------------------------|------------------------------|
| Morphine      | ~20 to 30                           | morphine-6-glucuronide<br>morphine-3-glucuronide<br>(inactive) | Hepatic                    | Urine (2 to 12% unchanged)   |
| Oxycodone     | 100 (IR vs ER)                      | oxymorphone (weak agonist)                                     | Hepatic<br>3A4;2D6         | Urine                        |
| Fentanyl      | NA                                  | none   | Hepatic<br>3A4             | Urine (10% unchanged)        |
| Methadone     | ~40-90                              | none   | Hepatic<br>3A4;2D6;2B6;1A2 | Urine (<10% unchanged)       |
| Hydromorphone | ~60                                 | hydromorphone-3-glucuronide<br>(inactive)                      | Hepatic<br>glucuronidation | Urine                        |

## Class of Chemical Compound

| <b>Natural</b> | <b>Semi-Synthetic</b> | <b>Synthetic</b> |
|----------------|-----------------------|------------------|
| Codeine        | Hydrocodone           | Fentanyl         |
| Morphine       | Hydromorphone         | Methadone        |
|                | Oxycodone             | Meperidine       |
|                | Oxymorphone           |                  |

# Half Life vs. Duration of Action

| Opioid              | Half life (hours) | Duration Of Action (hours) | Peak (hours) |
|---------------------|-------------------|----------------------------|--------------|
| Morphine IR PO      | 2-4               | 3-6                        | 1-2          |
| IV                  | ----              | 3-4                        | 0.5-1        |
| Oxycodone IR PO     | 2-3               | 3-6                        | 1-2          |
| Fentanyl IV         | 2-4               | 0.5-2                      | <10 minutes  |
| Methadone PO        | 8-59              | 6-8+                       | 1-2          |
| Hydromorphone IR PO | 1-3               | 3-6                        | 1-2          |
| IV                  | ----              | 3-4                        | 0.5-1        |

# Initial Opioid Doses for an Opioid Naïve Patient

| Opioid           | Per Julie<br>Amount per dose at a<br>reasonable dosing interval | Per Pkg Insert               |
|------------------|---|------------------------------|
| Morphine IV      | 2 to 4 mg   | 0.1 to 0.2 mg/kg q 4hrs prn  |
| Morphine PO      | 7.5 to 15 mg  | 15 to 30 mg q 4 hrs prn      |
| Fentanyl IV      | 12.5 to 25 mcg  | Surgery-low dose 2mcg/kg prn |
| Hydromorphone IV | 0.2 to 0.5 mg   | 0.2 to 1mg q 2 to 3 hrs      |
| Hydromorphone PO | 2 to 4 mg   | 2 to 4 mg q 4 to 6 hrs       |
| Oxycodone PO     | 2.5 to 5 mg   | 5 to 15 mg q 4 to 6 hrs      |
| Methadone PO     | 2.5 to 5 mg   | 2.5 mg q 8 to 12 hrs         |



# Avoiding Under or Over-Dosing

- Patient with AKI on MSContin 60mg PO BID as an outpatient admitted with altered mental status...
- Patient on OxyContin 80mg PO TID as an outpatient and is admitted s/p trauma, was NPO and is now post-op placed on a hydromorphone PCA at default settings of 0.2mg Q 15 minutes and 0.2mg by RN bolus q 2 hours. In the past 12 hours he has had 26 demand deliveries and is rating his pain 10/10...
- 86 yo opioid naïve patient admitted with severe abdominal pain and nausea/vomiting. Morphine 4mg IV q 3 hours prn is ordered...
- Patient is on a hydromorphone PCA after wound I&D with flap revision 8 days ago and has been receiving ~10 mg IV hydromorphone per day x past 4 days. Daily opioid requirement has not decreased since surgery. In transitioning to PO you do the math and start the patient on 100mg PO BID of MSContin with 15mg PO morphine q 3 hrs prn...

# Agents for Pain Control-WHO

- Mild Pain
  - *Nonopioid analgesics*
  - *NSAIDs*
- Mild to Moderate Pain
  - *APAP or NSAID combinations with opioids*
    - Adjuncts
      - *TCA*s
      - *Anticonvulsants*
      - *Steroids*

# Agents for Pain Control-WHO

- Moderate to Severe Pain
  - *Opioid analgesics*
  - *NSAIDs*
    - Adjuncts
      - *TCA*s
      - *Anticonvulsants*
      - *Steroids*

# Types of Pain

| PAIN SOURCE  | PAIN CHARACTER  | DRUG CLASS/EXAMPLES   |
|--|---|---|
| Somatic pain   | Constant and localized. Often worse with movement. Aching, gnawing                          | Muscle relaxants<br>APAP<br>NSAIDS (celecoxib, ibuprofen, naproxen, ketorolac)                    |
| Bone pain<br>Axial skeleton with thoracic and lumbar spine most common.                  | Deep, aching, throbbing punctuated by sharper intense pain, often triggered by movement     | Radiation therapy<br>NSAIDS<br>Corticosteroids<br>Bisphosphonates                                 |
| Visceral pain<br>Injury to sympathetically innervated organs.                            | Pain is vague in quality, sharp and deep aching, dull, squeezing, colicky and referred pain | Opioids   |
| Neuropathic pain<br>Injury to some element of the nervous system (plexus or spinal root) | Burning, stinging, tingling, weakness, radiation, numbness or altered sensation             | Tricyclic antidepressants (amitriptyline, desipramine, nortriptyline for burning pain)<br>Opioids |
| Nerve damage dysesthesia<br>May not respond well to opioid analgesics.                   | Dysesthesia, burning, tingling, numbing, shooting electrical pain                           | Anticonvulsants (gabapentin, carbamazepine, lamotrigine)  |

# Pain Assessment

- Location
- Radiation
- Onset and temporal pattern
- Description/Quality (sharp, dull, crampy, burning, stabbing, aching)
- Intensity/Severity (scale 1-10)
- Relieving factors (hot/cold, sitting/standing)
- Aggravating factors (moving, eating, physical effort)
- Associated symptoms (sedation, constipation, itching, dysuria, nausea)
- Previous treatment and outcome
- QOL issues
- Vital Signs

# Putting it all Together

- SP is a 45 yo male with a h/o EtOH and illicit drug use found down after an altercation that left him with a contusion to the skull, and a compound fracture of the tibia requiring surgical intervention with debridement and external fixation. The patient also had AKI thought to be induced by severe dehydration. SP sent to the ICU post-op where he was subsequently treated for sepsis, and pain management. 15 days later he is transferred to the medicine floor and you assume care.
- NKDA
- AKI resolved with Cr at baseline (0.80)
- LFTs wnl
- RR 16-19; O<sub>2</sub> Sats 96-100%

# Pain Assessment SP

- Location
  - *mostly tibia*
- Radiation
  - *no*
- Onset and temporal pattern
  - *Since hospitalization*
- Description/Quality (sharp, dull, crampy, burning, stabbing, aching)
  - *SP describes his pain as aching, constant, deep*

# Pain Assessment SP

- Intensity/Severity (scale 1-10)
  - 9/10
- Relieving factors (hot/cold, sitting/standing)
  - *Diazepam prn (patient states he's never had spasms)*
- Aggravating factors (moving, eating, physical effort)
  - *Any movement irritates hardware and screws*
- Associated symptoms (sedation, constipation, itching, dysuria, nausea)
  - *Negative BM x 3 days (on scheduled bowel care)*
- Previous treatment and outcome
  - *None*
- QOL issues
- Vital Signs
  - *Stable*



# Current Pain Regimen

- Fentanyl PCA at 200 mcg/hr and 50 mcg Q 15 minutes on demand (Current dosing for past 8 days)
  - *T-3 demand doses = 50 (7300 mcg fentanyl total)*
  - *T-2 demand doses = 39 (6750 mcg fentanyl total)*
  - *T-1 demand doses = 43 (6950 mcg fentanyl total)*
- SP also has active orders for percocet, morphine IV, hydromorphone IV and OxyIR

# Evaluation of SP

- AKI resolved
- Young male otherwise healthy organ function
- Morphine
  - *Active metabolites*
  - *Account for incomplete cross tolerance at the receptor level in conversion calculations*
- Options
  - *Convert to morphine PCA until pain is better controlled*
  - *Convert from fentanyl PCA to MSContin and MSIR*

# Evaluation of SP

- Is fentanyl the correct drug?
- Is pain controlled?
- Is SP having opioid-induced SE? 
  - *No BM x 3 days*
- Medications without indications? 
  - *Diazepam*
  - *All prn meds except new opioid entity*
- Adjuncts needed? 
  - *?? Boney pain at site of hardware screws*

# Calculations

## ■ Fentanyl PCA to morphine PCA

- 6750 to 7300 mcg/day fentanyl
- 7000 mcg (50%)=3500 mcg fentanyl=3.5 mg fentanyl
- 3.5 mg fentanyl=350mg IV morphine
- 350 mg IV morphine/24 hours
- Morphine 350 mg IV to hydromorphone
  - 350 mg morphine IV ÷ 7 mg IV hydromorphone = 50 mg IV hydromorphone in 24 hours; 50 ÷ 24 = 2 mg/hr hydromorphone
- Hydromorphone 1mg Q 20 minutes on demand with RN bolus 2 mg Q 2 hours prn
  - Demand 3mg/hr x 24 hrs = 72 mg IV hydromorphone; 72 mg IV hydromorphone x 7mg IV morphine = 504 mg IV morphine
  - RN bolus 2mg x 12 = 24 mg IV hydromorphone/24 hours; 24 mg IV hydromorphone x 7mg IV morphine = 168 mg IV morphine
  - 168 + 504 =672 mg IV morphine available per day

## ■ Fentanyl PCA to PO morphine (ER and IR)

- 6750 to 7300 mcg/day fentanyl
- 7000 mcg (50%)=3500 mcg fentanyl=3.5 mg fentanyl
- 3.5 mg fentanyl=350mg IV morphine = 1050 PO morphine
- 1050 ÷ 2 = 525 mg PO morphine
- 525 ÷ 3 (TID dosing) = 175 mg/dose
- MSContin 100 mg PO TID with MSIR 30mg PO Q 3 hours prn + 8 mg IV morphine Q 2 hours prn
  - 8mg x 12 =96 mg IV morphine; x 3 =288mg PO morphine/day
  - MSContin 300 mg morphine PO/day
  - MSIR 240mg PO/day
  - 288 + 300 + 240 = 828 mg PO morphine available per day

# 2018 Arizona Opioid Epidemic Act

- Effective April 26, 2018
- Schedule II opioid prescriptions limited to 5 day supply or 14 day supply after a surgical procedure
- Exemptions
  - *Active oncology diagnosis*
  - *Traumatic injury excluding a surgical procedure*
  - *Hospice or end of life care*
  - *Palliative care*
  - *Treatment for burns or skilled nursing care*
  - *Medical-assisted treatment (MAT) for a substance use disorder*
  - *Infant being weaned off opioids at the time of hospital discharge*

# Maximum Morphine Milligram Equivalents (MME)

- 90 morphine milligram equivalents per day
  - *Patient should also be provided an RX for naloxone*
  - *Must consult with a board-certified pain physician prior to prescribing*
    - *Can Rx if consulting physician is not available for consult within 48 hrs*
    - *Consult must occur subsequent to the Rx being written*
- Exemptions
  - *Continuation of a prior RX issued within the previous 60 days*
  - *A hospitalized patient*
  - *Active oncology diagnosis*
  - *Traumatic injury excluding a surgical procedure*
  - *Hospice or end of life care*
  - *Palliative care*
  - *Treatment for burns or skilled nursing care*
  - *Medical-assisted treatment (MAT) for a substance use disorder*

# More to Come...

- Beginning January 1, 2019 electronic prescriptions for C-lls will be required in Maricopa, Pima, Pinal, Yavapai, Mohave and Yuma counties
- Beginning July 1, 2019 electronic prescriptions for C-lls will be required in Greenlee, La Paz, Santa Cruz, Gila, Apache, Navajo, Cochise and Coconino counties

# Reminder...

- If you have a DEA number you are required to be registered for the Controlled Substances Prescription Monitoring Program (CSPMP)
- Check CSPMP prior to prescribing opioids or BZDs and at least quarterly for ongoing treatment
- Register at <https://pharmacympm.az.gov/>

Arizona Revised Statute (A.R.S.) § [36-2606](#)



