Acute Pain Management

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https://www.youtube.com/watch?v=KPrSHrIvWI4

Learning Objectives

- Describe the differences between somatic, visceral, and neurogenic pain.
- Understand the different "pain scales" used for patients to describe the severity of their pain.
- Describe the initial management of an opiate naïve patient who is in acute severe pain from a broken limb.
- Describe the initial management of a patient with chronic, long- acting opiate use who presents with the onset of severe acute on chronic pain.
- Understand opiate equivalent doses. Be able to convert different opiates from IV to oral based on these equivalents. Know how to adjust for cross-tolerance.
- Know how to access the prescription monitoring program (PMP) database to make informed decisions about opioid therapy.
- Apply the knowledge you gained by reviewing the objectives and reading the articles about pain management in the hospital setting to patient cases.

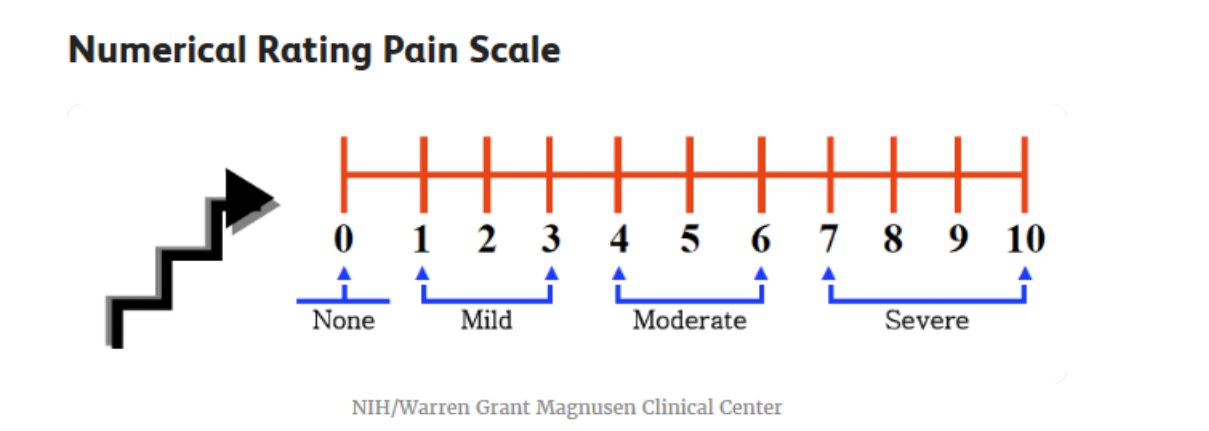
"Describe Your Pain"

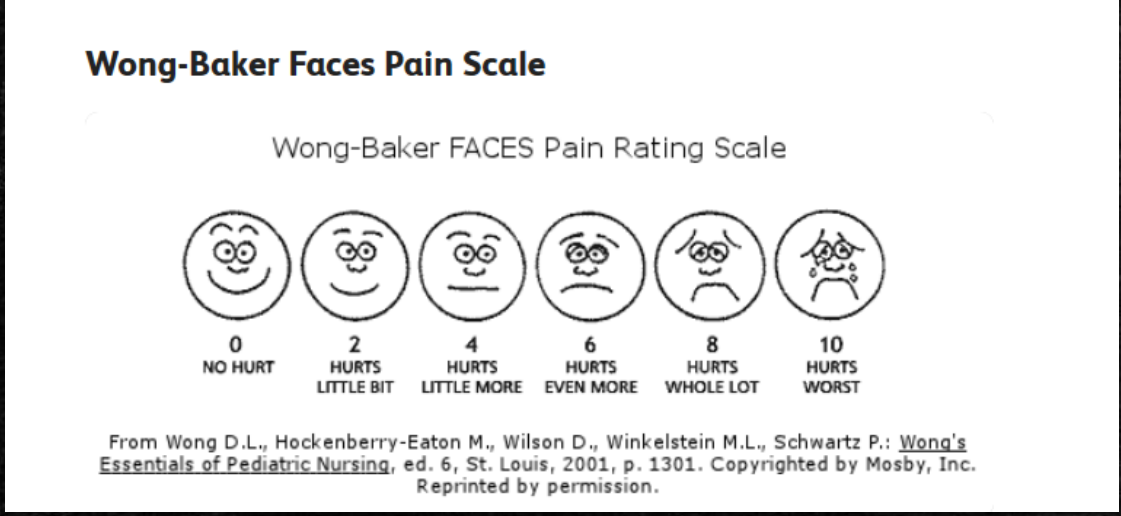
Types of Acute Pain

- **Nociceptive Pain (Somatic)**
  - Nerves sense and respond to damage to soft tissue, muscle or bone
  - Aching, throbbing, localized, constant
- **Visceral (Referred)**
  - Poorly localized, referred based on embryologic development
  - Distention, ischemia, and inflammation are triggers
  - Aching, squeezing, deep,colicky
  - Associated with nausea, vomiting
- **Neuropathic (Neurogenic)**
  - Nervous system structures themselves are injured (trauma, entrapment, disease)
  - Burning, sharp, electrical shock type feeling
- **Mixed**

“Rate Your Pain”

Assess Severity





- Mild Pain
  - 1-3
  - Generally, opiates not necessary
- Moderate Pain
  - 4-6
- Severe Pain
  - 7-10

Choose Your Method of Pain Relief

Mild 1-3
- Hot pack/ Ice pack/ Massage
- Oral Acetaminophen*/ Ibuprofen**

Mod 4-6
- IV NSAID (ketorolac)
- Oral opioid/ Acetaminophen combo

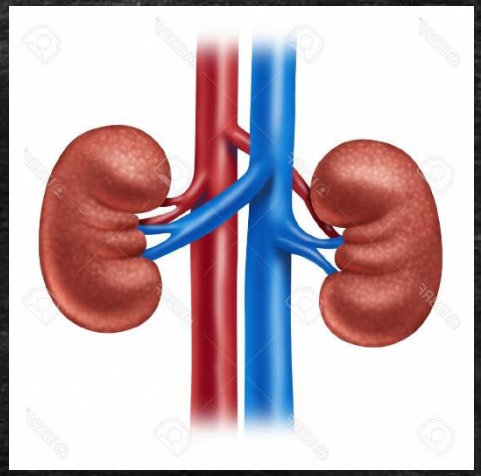
Severe 7-10
- IV Opioid

- Adjunctive agent for chronic pain
  - Anti-inflammatory (somatic)
  - Antidepressant /antiepileptic (neurogenic)

*Acetaminophen is safe up to 2000 mg/24 hours in cirrhosis
**Ibuprofen use with caution renal failure and peptic ulcer dz

Other Considerations…

- Age of patient
- Opioid näive or tolerant
- Renal function
- Hepatic function



Case 1

A 24- year- old woman previously healthy woman is admitted for a large peritonsillar abscess. She is unable to open her mouth or swallow due to severe pain. She has no airway compromise. The ENT doctor has seen the patient and determines that she needs to go to the OR for drainage in approximately 4 hours. He has prescribed IV unasyn and decadron.

The patient has a normal chemistry panel with a WBC of 17,000.

You are called to see the patient who is crying due to severe pain.

Which of the following is the most appropriate choice for pain control in this patient?

A. Oral ibuprofen 600-800 mg now
B. IV ketorolac 15 mg now
C. Oral acetaminophen 325 mg/oxycodone 5 mg x 2 now
D. IV morphine 2-4 mg now

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You give the patient a dose of morphine 2 mg IV.

One hour later the nurse calls to tell you that the patient is extremely upset and feels no relief from the medication you prescribed.

Which of the following is the *LEAST* likely explanation?

A. The patient is drug-seeking

B. The patient is "pseudoaddicted" and is really in significant pain

C. The dose of the medication was not high enough to give her significant pain relief

D. The inflammatory source of her pain might have been better treated with ketorolac

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Case 1

Which of the following would have been the best strategy to prevent the patient's pain for the past hour?

A. Order a PCA (patient-controlled analgesia) pump for the patient to give herself as needed IV pain medication

B. Stay at the bedside for 10-15 minutes to see if she had relief

B. Start with a higher dose of IV narcotic as the first dose

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Onset of Action:
Wait to see response and re-dose if needed

Drug (United States brand name)	Sample initial dose for opioid-naïve adult ¶	Serum half-life (in hours)	Duration of analgesic effect (in hours)
Parenteral opioids			
Fentanyl (Sublimaze)	25 to 50 mcg for moderate pain or 50 to 100 mcg for more severe pain IV/subcutaneous; repeat every two to five minutes as needed until adequate pain relief	7 to 12	0.5 to 1 (IV) 1 to 2 (subcutaneous)
Hydromorphone (Dilaudid)	0.2 to 0.5 mg IV; repeat every five minutes as needed until adequate pain relief, then 0.2 to 0.5 mg IV three to four hours as needed	2 to 3	3 to 4
Morphine (Infumorph, others)	1 to 3 mg IV; repeat every five minutes as needed until adequate pain relief; then 1 to 3 mg IV every three to four hours as needed	2 to 3	4 to 5

Case 2

A 39- year-old previously healthy woman comes to the ED with a broken humerus after a fall in her garage. The arm is in a splint applied by paramedics, and x-ray reveals a spiral fracture with displacement that will need surgery.

The paramedics have given her morphine IV 1 mg every 5-10 minutes in the ambulance for a total of 5 mg (over 30 minutes). She is tearful but able to move the arm for the x-ray without yelling in pain. She is not sedated.

Surgery is planned for tonight in about 6-7 hours.

In the ED, she is given 50 mcg IV fentanyl q 30 minutes for 3 hours (six doses) before she goes to the ortho floor. Her pain is at a 4, and she is not sedated.

What is the total equivalent dose of morphine that she received in the ED for the past 3 hours?

A. 30 mg

B. 10 mg

C. 300 mg

D. 100 mg

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Know the Opioid Dose Equivalents

DRUG	Equianalgesic Doses (mg)	
	IV	Oral
Morphine IR	10 mg	30 mg
Fentanyl	100 ***mcg***	NA
Hydromorphone (Dilaudid)	1.5-2 mg	7.5-8 mg
Meperidine Demerol	75 mg	300 mg

Fentanyl 50 mcg x 6 = 300 mcg

$$\frac{100 \text{ mcg F}}{300 \text{ mcg}} = \frac{10 \text{ mg M}}{X \text{ mg}}$$

X= 30 mg

Case 3

A 50-year-old man with a history of alcohol abuse comes to the hospital with an episode of acute pancreatitis. He states that his pain is "11/10" and is curled up on his side in the bed.

He has a history of cirrhosis of the liver from alcohol. His creatinine is 2.1 on admission (up from 1.2 as outpatient.)

What is the best choice of pain medicine to give this patient?

A. IV fentanyl

B. IV morphine

C. IV dilaudid

D. IV demerol

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Pharmaco..what?

- Pharmacokinetics:
  - What the body does to the drug
- Pharmacodynamics:
  - What the drug does to the body

- Morphine
  - Onset (10 minutes)
  - Histamine release (flushing, tachycardia, hypotension)
  - Renal metabolism to M3 and M6
  - Not recommended Crcl< 30
- Fentanyl (synthetic)
  - Rapid onset (3-5 minutes)
  - Minimal hemodynamic effects and no histamine release
  - No change in pharmacokinetics due to renal or hepatic insufficiency
- Hydromorphone (semi-synthetic)
  - Onset (10 minutes)
  - Prolonged duration of action (q 4-6 hours)
- Meperidine
  - No longer first line
  - Renal metabolite, normeperidine is neurotoxic causing seizures

Side Effects of Opioids

- Sedation
- Respiratory depression
- Nausea
- Pruritis (histamine release)
- Hypotension
- Constipation
- Urinary retention

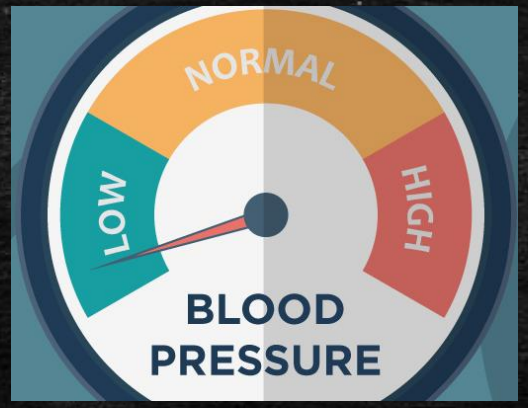

Table 1 Drugs for treating nausea (used in a palliative care setting)

Drug Class	Mechanism of Action	Nausea Response
Butyrophenones (haloperidol, droperidol)	D_2 blockade in CTZ	Chemical irritation, visceral
Phenothiazines and derivatives (chlorpromazine, prochlorperazine, thiethylperazine)	D_2 blockade in CTZ and GI tract	Vestibular
Antihistamines (cyclizine, diphenhydramine, hydroxyzine, meclizine, promethazine)	H_1 blockade in vomiting center and vestibular apparatus	Vestibular
Anticholinergic agents (hyoscine, scopolamine)	Muscarinic blockade in vomiting center and GI tract	Vestibular
Serotonin antagonists (dolasetron, granisetron, ondansetron)	5-HT_3 blockade in GI tract and CTZ	Gastric stasis
Prokinetic agents (metoclopramide)	D_2 blockade in GI tract and CTZ; 5-HT_4 stimulation in GI tract; 5-HT_3 blockade in CTZ and GI tract (high dosages)	Gastric stasis
Benzodiazepines (lorazepam)	GABA agonist	Anticipatory nausea

D_2 = D_2 dopaminergic; CTZ = chemoreceptor trigger zone; GI = gastrointestinal; H_1 = histamine type 1; 5-HT = serotonin; GABA = γ-aminobutyric acid.

Adapted with permission from Herndon et al. [20].

https://academic.oup.com/painmedicine/article/10/4/654/1829738

Case 4

A 42-year-old man with sickle cell disease is admitted with an acute pain crisis. He tells you that he is on chronic long acting MS Contin daily at 100 mg Q 8 hours, and also takes Percocet 5 mg/325 mg 1-2 pills po every 6 hours as needed for breakthrough pain.

On admission he appears in severe pain, in his shoulder and low back.

Vital signs reveal a BP of 140/90 mm Hg, HR 100, and he is afebrile. 02 saturations are 95% on room air. Labs reveal a hemoglobin of 7 g/dL, reticulocyte count of 15% and normal creatinine at 0.8 mg/dL

Which of the following is the most appropriate next step in the management of this patient's pain?

A. Call the patient's pharmacy to confirm the outpatient dose

B. Call the patient's primary care doctor to confirm the outpatient dose

C. Look up the patient on the PMP website to determine his outpatient regimen

D. Ask to patient's family to bring the prescription bottle to confirm the outpatient dose

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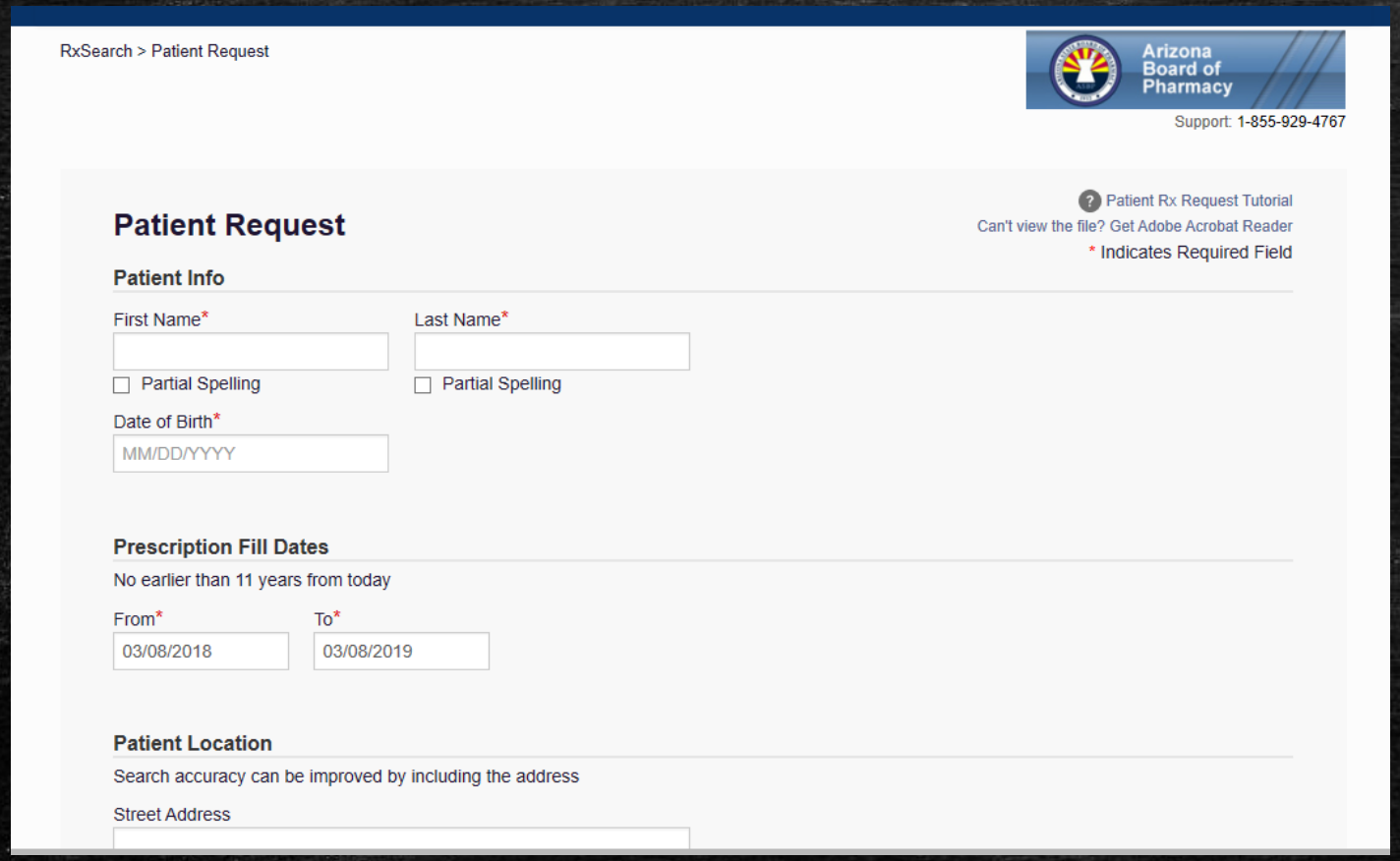
Search PMP (Prescription Monitoring Program)
https://arizona.pmpaware.net



- Verify prescriptions and doses
- Look for "doctor and pharmacy shopping" behavior
- Look for coexisting benzodiazepines
- It's the law!!

Case 4

A 42 year-old man with sickle cell disease is admitted with an acute pain crisis. He is on chronic long acting MS Contin daily at 30 mg Q 12 hours, and also takes Percocet 5 mg/325 mg 1-2 pills po every 6 hours as needed for breakthrough pain.

On admission he appears in severe pain, in his shoulder and low back.

Vital signs reveal a BP of 140/90 mm Hg, HR 100, and he is afebrile. 02 saturations are 95% on room air. Labs reveal a hemoglobin of 7 g/dL, reticulocyte count of 15% and normal creatinine at 0.8 mg/dL

Which of the following is the best strategy for the patient's acute pain?

A. Continue MS Contin 30 q 12 hours and start IV morphine 5 mg q 3-4 hours

B. Stop MS Contin and start IV morphine 5-10 mg q 3-4 hours

C. Continue MS Contin and start IV patient controlled analgesia (PCA) with IV fentanyl

D. Stop MS Contin and start IV patient controlled analgesia (PCA) with IV morphine

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Tolerance and Physical Dependance

- **Tolerance**
  - **State of adaptation**
  - **Exposure induces changes that produces a diminution of 1 or more of the drug's effects over time**
    - Sedation vs analgesia
  - **For opioids and analgesia this means a need to increase the dose to achieve the same previous effect**
  - **Not indicative of addiction**

- **Physical Dependence**
  - **State of adaptation manifested by drug class-specific withdrawal syndrome**
    - Abrupt cessation
    - Rapid dose reduction
    - Administration of an antagonist
  - **Occurs in all patients using opioids for a period of time**
  - **Physical dependence is not indicative of addiction**

Acute Pain Management in Opioid Tolerant Patients

- New acute on chronic pain
- Continue long-acting opioids for baseline chronic pain
- Start short acting opioids for the new acute pain
- Dose may need to be higher than the opiate naïve patient due to tolerance

	Acute Pain	Chronic Pain
Onset	Usually sudden	Long duration
Characteristics	Sharp, localized, may radiate	Dull, aching, persistent, diffuse
Signs and Symptoms	Autonomic response Hyperactivity Emotional response Anxiety, restlessness	Autonomic response Often absent Emotional response Flat, depressed

Indications for Patient Controlled Analgesia (PCA)

1. Post-operative pain
2. Severe acute pain
3. Acute exacerbations of
   chronic pain
4. Cancer pain
5. Patients unable to take
   oral medications

- Loading dose
  - 2 mg IV morphine q 5 minutes for maximum of 20 mg
- Basal dose
  - Only for opioid tolerant patients
  - Severe rest pain/nighttime pain
  - 2 mg IV morphine q 1 hour
- Demand dose
  - Patient delivered dose when they press the button
  - 2 mg IV morphine
- Lock out interval
  - The time interval before the pump can deliver the next dose
  - 10 minutes = the patient can push the button 20 times in 10 minutes but will only get one dose

Case 5.

Your patient in Case 2 underwent ORIF of the humeral fracture. Her pain after surgery is significantly improved compared to pre-operatively. She is ready for discharge from the hospital the next day.

According to the Arizona Opioid Epidemic Act in 2018, what is the maximum amount of opioid you able to give the patient for post-operative pain?

A. Oxycodone 5 mg po: 1 tab q 6 hours prn pain x 5 days (#20)
B. Percocet 5/325 mg po: 2 tabs po q 4 hours prn pain x 7 days
C. Oxycodone 5 mg po: 1 tab q 6 hours prn pain x 14 days (#56)
D. 14 days of opiate prescription at less than 90 MME

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Arizona Opioid Epidemic Act Provisions-Jan 2018

THE UNIVERSITY OF ARIZONA
MEL & ENID ZUCKERMAN COLLEGE OF PUBLIC HEALTH
Center for Rural Health

Good Samaritan Law

- Prohibits drug possession charges if seeking assistance

Prohibits dispensing, tighter prescribing rules for schedule II substances

- 5-day limit for initial prescriptions, 14-day for surgical procedure
- 90 MME dose limits
- Exemptions for traumatic injury, oncology, hospice/palliative care, prior scripts, MAT, etc.
- Naloxone prescriptions encouraged, required if >90 MME

Electronic prescription monitoring

- Providers are required to check PDMP database (for sch II or benzo)
- Electronic prescription required for all, beginning 1/1/2020

Case 5.

What is the MME for this patient's opioid prescription of oxycodone 5 mg po q 6 hours?

- A. 20 MME
- B. 30 MME
- C. 40 MME
- D. 50 MME

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HOW SHOULD THE TOTAL DAILY DOSE OF OPIOIDS BE CALCULATED?

1. **DETERMINE** the total daily amount of each opioid the patient takes.
2. **CONVERT** each to MMEs—multiply the dose for each opioid by the conversion factor. (*see table*)
3. **ADD** them together.

Calculating morphine milligram equivalents (MME)

OPIOID (doses in mg/day except where noted)	**CONVERSION FACTOR**
Codeine	0.15
Fentanyl transdermal (in mcg/hr)	2.4
Hydrocodone	1
Hydromorphone	4
Methadone	
1-20 mg/day	4
21-40 mg/day	8
41-60 mg/day	10
≥ 61-80 mg/day	12
Morphine	1
Oxycodone	1.5
Oxymorphone	3

These dose conversions are estimated and cannot account for all individual differences in genetics and pharmacokinetics.

CAUTION:

- Do not use the calculated dose in MMEs to determine dosage for converting one opioid to another—the new opioid should be lower to avoid unintentional overdose caused by incomplete cross-tolerance and individual differences in opioid pharmacokinetics. Consult the medication label.

USE EXTRA CAUTION:

- **Methadone:** the conversion factor increases at higher doses
- **Fentanyl:** dosed in mcg/hr instead of mg/day, and absorption is affected by heat and other factors

Questions?