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Disclosure Statement

- Neither I nor my family have any relevant personal or financial relationships that would engender conflicts of interest.

- I will not discuss all adverse effects or contraindications.
We (medical professionals) helped create this problem.

We need to help turn it around.
Questions to answer...

- What is opioid-induced hyperalgesia?
- What is multimodal analgesia?
- What does appropriate pain management look like?
- When should PCA’s be used?
- What tools can I use to optimize pain management and minimize the risk of opioid abuse/misuse?
- What should I know about the opioid agonist/antagonists? (e.g., Suboxone)
Pain Processing Sites

- Peripheral receptors
- Spinal Cord
- Brain

Some pain receptors: opioid, GABA, NMDA

The pain pathway is always changing!

Peripheral and central sensitization happen all the time.

Pain perception involves emotions.
Sensitization Phenomena

- **Hyperalgesia**: an exaggerated pain response to a normally painful stimulus

- **Allodynia**: a painful response to a typically non-painful stimulus
Opioid-Induced Hyperalgesia (OIH)

- Disorder of central pain processing caused by acute or chronic opioid use. Also known as “wind-up phenomenon.”
- NMDA receptor has been implicated in pathophysiology
- Can develop in hours, days or months
- Not uncommon in patients with exclusive opioid use
- We see this every day.
What is Multimodal Analgesia?

- Use of multiple drug classes (not just opioids) for pain management
  - Minimizes risk of adverse effects (including opioid use disorder)
  - Optimizes pain control
  - The best way to combat opioid-induced hyperalgesia
  - This is for EVERYONE.

- Your post-operative patient? YES.
- Your grandmother? YES.
- Yourself? YES.

**Bottom Line:** The best way to treat almost ANY kind of pain is with a multimodal approach.
Drugs for Pain (*not all of them*)

- Acetaminophen
- Salicylates (aspirin)
- NSAID’s: naproxen, ibuprofen, ketorolac
- COX-2 Inhibitors: celecoxib
- Tricyclic antidepressants: amitriptyline, nortriptyline
- Gabapentinoids: gabapentin, pregabalin
- NMDA antagonists: ketamine, memantine, methadone
- Alpha-2 agonists: clonidine, dexmedetomidine
- Local anesthetics: local infiltration, nerve blocks, spinal/epidural, topical (EMLA, Lidoderm), IV lidocaine
- Opioids
- And all the non-pharmacologic modalities!
Some Options for Neuropathic Pain

- TCA’s (amitriptyline, nortriptyline, desipramine)
- Gabapentinoids (gabapentin, pregabalin)
  - **NMDA antagonists** (methadone, ketamine, memantine)
  - **Local anesthetics** (patches, creams, IV lidocaine)
- Menthol products (BenGay, Icy Hot, Biofreeze)
- Capsaicin
- Anticonvulsants (lamotrigine, carbamazepine, topiramate)
- SNRI’s (duloxetine, venlafaxine)
- Device-based therapies (TENS, spinal cord stimulator)
Acetaminophen

- No anti-inflammatory properties
- Effective analgesic and antipyretic
- Inhibits prostaglandin synthesis in CNS
  - Very little effect on COX enzyme in peripheral tissues
- Oral, rectal, IV formulations
IV Acetaminophen (Ofirmev)

- Reaches peak plasma levels higher and faster (15 min) than PO or PR formulations
- Reaches much higher CNS concentration than can be achieved with PO or PR
- Reliable absorption and effect
- Opioid-sparing effect
- Higher patient and nurse satisfaction
- Relatively expensive
Aspirin (salicylic acid)
Ibuprofen, naproxen, ketorolac, diclofenac, indomethacin

All above are reversible, non-selective COX inhibitors

Decrease synthesis of prostaglandins (esp. PGE-2)
  - Decrease inflammation AND sensation of pain
  - Decrease fever

Adverse effects:
  - Gastric irritation
  - Decreased platelet aggregation
  - Decreased renal blood flow
An NSAID with COX-2 specificity

This limits the adverse effects:
- Same renal effects as other NSAIDS
- *Lower* risk of gastric irritation/ulceration
- *No* effect on platelet function
Ketamine

- Synthesized in 1962
- NMDA-antagonist
- Potent analgesic
- Acts as a dissociative *anesthetic* at high doses.

- Infusion 0.1-0.25 mg/kg/hr → fewer opioids, better pain control.
- Higher doses may cause hallucinations
  - Can be minimized with benzo pre-treatment
Methadone

- Synthesized in 1939

- **Affects multiple receptors:**
  - Opioid agonist (like morphine)
  - NMDA antagonist (like ketamine)
  - Serotonin/Norepinephrine reuptake inhibitor (like SNRI’s)

- **PO form:** highly variable duration of action.
  - Elimination outlasts analgesic effect!
  - Initiation: Start low, go slow

- **IV form:** predictable and long-lasting
Opioids

- **Strong agonists**
  - Morphine, meperidine, methadone, fentanyl, sufentanil, alfentanil, remifentanil, heroin

- **Weak agonists**
  - Codeine, propoxyphene

- **Partial Agonists-Antagonists**
  - Buprenorphine (Subutex)
  - Nalbuphine (Nubain)

- **Pure antagonists**
  - Naloxone (Narcan)
  - Naltrexone (Revia, Vivitrol)
Opioid Tolerance & Dependence

- **Tolerance**: Escalating doses needed to reach same effect

- **Physical Dependence**: Physiologic adaptation to the presence of the drug; abstinence causes withdrawal

- Dependence is *not* addiction
Opioid-Induced Hyperalgesia (OIH)

- **Question**: How can we minimize the risk of OIH?

- **Answer**: Best practice pain management!
  - Minimizes OIH risk
  - Improves pain control
  - Improves patient safety

- But how do we do this?
Minimizing OIH

1) Preemptive analgesia

2) Good baseline pain control—Avoid the ups and downs!
   - More reliance on longer-acting drugs
   - More orals, less IV

3) Multimodal Analgesia!
   - A little bit of everything, rather than a lot of one thing
   - Minimizes side effects of any one drug class
   - NMDA receptor has been directly linked with OIH
Case Report: Opioid-Induced Hyperalgesia

- Acute Pain Service consulted to see patient in the ICU

- **HPI:** 23yo female, 33 weeks pregnant. Hospitalized 4 weeks prior with a cervical spinal cord injury.
- Ventilator-dependent with tracheostomy—unable to wean
- Complains of intractable neuropathic pain down both arms. No other pain.
Pain has been poorly controlled with current regimen of meds:

- Fentanyl patch 25 mcg/hr (600 mcg per day)
- IV fentanyl Q1hr PRN: 600-1000 mcg per day
- Oxycodone Q4hr PRN: 60-100 mg per day
- Acetaminophen Q4hr PRN: 2000-3000mg per day
- Gabapentin 600 mg TID
Case Report (cont.)

- Patient has exclusively neuropathic pain, but...

- Use of focused anti-neuropathic agents limited by risk to fetus:
  - No NSAID’s
  - No TCA’s
  - Low/medium dose GABA-ergic drugs (gabapentin)

- Neuropathic pain treated almost exclusively with PRN opioids
  - Pain is poorly controlled. Opioids are a suboptimal treatment here.
  - Patient developed clear-cut OIH
    - Massive cumulative opioid exposure
    - No baseline pain control. Up and down all day.
So what do you do?

- Control her pain
- Minimize OIH

She has real pain from her trauma.
And now she has OIH too.
My Plan:

- **STOP PRN Fentanyl**
- Start oral methadone 20 mg BID
  - Opioid agonism and NMDA antagonism
- **Scheduled acetaminophen** to ensure good baseline level
- Continue scheduled gabapentin
- Continue fentanyl patch (until it’s done)
- Continue PRN oxycodone
- Start PRN IV hydromorphone for breakthrough pain
Day 1

- Pain dramatically better
- Able to tolerate T-piece for first time
- Oxycodone use: 60 mg
- IV hydromorphone use: 4 mg

Plan:
- Increase methadone to 30 mg BID
- Advise patient that oral opioids will provide better, longer-lasting baseline coverage than IV opioids
Day 2

- Pain better still
- Still tolerating T-piece
- Oxycodone use: 60 mg
- IV hydromorphone use: 3 mg

**Plan:**
- Further increase methadone to 30 mg TID
- Decrease frequency of PRN IV hydromorphone, to encourage more reliance on PO oxycodone
- STOP Fentanyl patch
Day 3

- Good pain control, with more steady baseline
- Still on T-piece
- Oxycodone use: 75 mg
- IV hydromorphone use: 0.4 mg

Plan:
- Continue current regimen
Day 4

- Much better pain control; now on stable methadone regimen for 2 days
- Has not needed ventilator for 3 days
- Oxycodone use in past day: NONE
- IV hydromorphone use in past day: NONE

- Plan:
  - Continue current regimen

- Patient discharged from ICU several days later.
Within 24 hours of starting methadone, patient was off the ventilator for good.
Within 4 days of starting methadone, patient had much better pain control with NO additional opioids.

**Conclusion:**
- OIH can be relieved with the right approach.
- Sometimes you have to get creative with neuropathic pain.
The problem:
- Pure neuropathic pain poorly controlled with massive doses of PRN opioids
  - Oxycodone 60-100 mg per day
  - Fentanyl 1200-1600 mcg per day (IV, patch)

The solution:
- Treat neuropathic pain with NMDA antagonist (methadone)
- Fewer short-acting drugs (methadone is long-acting)
- Patient is getting LESS opioid, and feels BETTER!
Poor Pain Management

- We see this every day. We don’t have to.

- Exclusive opioids for pain—NEVER a good idea.

- Multimodal Analgesia—ALWAYS a good idea.
What is Multimodal Analgesia?

- Acetaminophen
- Salicylates (aspirin)
- NSAID’s: naproxen, ibuprofen, ketorolac
- COX-2 Inhibitors: celecoxib
- Tricyclic antidepressants: amitriptyline, nortriptyline
- Gabapentinoids: gabapentin, pregabalin
- NMDA antagonists: ketamine, memantine, methadone
- Alpha-2 agonists: clonidine, dexmedetomidine
- Local anesthetics: local infiltration, nerve blocks, spinal/epidural, topical (EMLA, Lidoderm), IV lidocaine
- Opioids
Benefits of Multimodal Analgesia

- Minimizes side effects of any one drug class
- Better pain control with less opioid!

Minimizes opioid exposure:
- Less opioid-induced hyperalgesia
- Less respiratory depression
- Less constipation
- Less nausea/vomiting
- Less itching
- Less opioid tolerance & dependence
- Earlier discharge
In conclusion...

- Multimodal analgesia is:
  - Better.
  - Safer.
  - Cheaper.
• Opioids are not all bad!
  • We still need them.

• Just don’t forget about the other tools in the toolbox!
  • Don’t be complacent; be creative.
Who Can Benefit from Multimodal Therapy?

Everyone.
(including us)

The best way to treat almost ANY kind of pain is with a multimodal approach.
Multimodal Analgesia: Example

- 64 yo male with chronic low back pain.
- Pain poorly managed on oxycodone and ibuprofen
- Has baseline pain score of 6/10.
- Can’t we do better than this?
Some Drug Choices...

- Acetaminophen
- Salicylates (aspirin)
- NSAIDS: naproxen, ibuprofen, ketorolac
- COX-2 Inhibitors: celecoxib
- Tricyclic antidepressants: amitriptyline, nortriptyline
- Gabapentinoids: gabapentin, pregabalin
- NMDA antagonists: ketamine, memantine, methadone
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Some Options for Neuropathic Pain

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- Menthol products (BenGay, Icy Hot, Biofreeze)
- Capsaicin
- Anticonvulsants (lamotrigine, carbamazepine, topiramate)
- **SNRI’s** (duloxetine, venlafaxine)
- Device-based therapies (TENS, spinal cord stimulator)
Questions?
(no, this is not the end)
Good baseline pain control—minimize the ups and downs!

- More orals, less IV
- More reliance on longer-acting IV drugs (e.g., not fentanyl)
- Do NOT assume that a PCA is always the best way to control acute pain.

MULTIMODAL ANALGESIA!

- A little bit of everything, rather than a lot of one thing
- Minimizes side effects of any one drug class
- For severe and/or chronic pain, block the NMDA receptor if you can!
Patients who can take PO meds
DO NOT NEED A PCA
**PCA's: An institutional addiction**

- Most patients who can take oral meds SHOULD NOT HAVE A PCA. They should take oral meds!
  - Cheaper
  - Easier
  - Safer
  - Better pain control (longer-lasting analgesia, fewer ups and downs)
  - Better patient satisfaction
  - Faster discharge
  - Lower risk of OIH

- If you must use a PCA, morphine and Dilaudid are far more effective (and safer) than fentanyl.
86yo man with 8 broken ribs after fall off of tractor. Treated exclusively with fentanyl PCA since admission. Has been sleeping for 18 hours, but wakes up in agony.

Our typical plan:

- Stop PCA
- Scheduled Tylenol
- Scheduled Ibuprofen
- PRN oxycodone Q3hrs
- IV Dilaudid for breakthrough pain only
- Consider adding Lyrica/Neurontin for a few days
- Consider lidocaine patches to site
Other Examples...

- I can cite many.

- The solution is not the same for every patient, but the concept is.
21st Century Pain Management Overview

- **Appropriate pain management**
  - Employ multimodal analgesia (opioids should *not* be first choice)
  - Rely more on oral meds
  - PCA usually *only* for patients unable to take oral meds

- **Inappropriate Pain Management: An Epidemic!**
  - Overreliance on opioids leads to:
    - Poor pain control
    - Opioid-induced hyperalgesia
    - Opioid overuse/abuse → dependence/addiction
    - Adverse outcomes, including death

- The national opioid crisis—we helped create it. We need to help fix it.
How can we help?

- Educate providers on appropriate pain management
- *Develop tools* to ensure optimal outcomes and maximize patient safety
PAMC Pain Management Council

- Interdisciplinary group created in spring 2015. Goals:
  - Provider education
  - Patient safety
  - Evidence-based best practice

- Appropriate multimodal pain management and reduction of opioid use has been the vision from the start.

- Primary initiatives since 2015:
  - Decrease inappropriate PCA use as first step in improving pain management
    - Educate providers!
    - Develop tools for them!
  - Multimodal Pain Management Ordersets in Epic
    - Pre-op and Post-op ordersets, now embedded into every post-op orderset in the Providence system
MMPM Pre-op: Acetaminophen, NSAID’s, Gabapentinoids

Multimodal Pain Management Preop

Undetermined Risk Patient

Multimodal Pain Management Undetermined Risk

- Unknown risk of adverse effects from pain meds
- Consider reduced dose option if decreased renal function, risk of sleep apnea or weight <61kg

Acetaminophen

- acetaminophen (TYLENOL) tablet
  1,000 mg, Oral, SEE ADMIN INSTRUCTIONS, for 1 dose, Nursing to

- acetaminophen (TYLENOL) soln/susp
  1,000 mg, Oral, SEE ADMIN INSTRUCTIONS, for 1 dose, Nursing to

NSAIDs

- celecoxib (CELEBREX) capsule (standard dose)
  400 mg, Oral, SEE ADMIN INSTRUCTIONS, for 1 dose, Nursing to

- celecoxib (CELEBREX) capsule (reduced dose)
  200 mg, Oral, SEE ADMIN INSTRUCTIONS, for 1 dose, Nursing to

- ibuprofen (ADVIL, MOTRIN) tablet (standard dose)
  600 mg, Oral, SEE ADMIN INSTRUCTIONS, for 1 dose, Nursing to

- ibuprofen (ADVIL, MOTRIN) tablet (reduced dose)
  400 mg, Oral, SEE ADMIN INSTRUCTIONS, for 1 dose, Nursing to

- naproxen (NAPROSYN) tablet for (standard dose)
  500 mg, Oral, SEE ADMIN INSTRUCTIONS, for 1 dose, Nursing to

- naproxen (NAPROSYN) tablet (reduced dose)
  250 mg, Oral, SEE ADMIN INSTRUCTIONS, for 1 dose, Nursing to

Gabapentinoids

- Consider use if anticipated moderate to severe postop pain. Titrate to benefit. Reduced dose recommended if any one of the following:
  - age > 64
  - decreased renal function
  - risk of sleep apnea
  - neuraxial opiate used
  If ≥ 2 risk factors present, consider omitting

- gabapentin (NEURONTIN) capsule (standard dose)
  600 mg, Oral, SEE ADMIN INSTRUCTIONS, for 1 dose, Nursing to give 60 minutes before time of surgery, Pre-op

- gabapentin (NEURONTIN) capsule (reduced dose)
  300 mg, Oral, SEE ADMIN INSTRUCTIONS, for 1 dose, Nursing to give 60 minutes before time of surgery, Pre-op

- pregabalin (LYRICA) capsule (standard dose)
  100 mg, Oral, SEE ADMIN INSTRUCTIONS, for 1 dose, Nursing to give 60 minutes before time of surgery, Pre-op

- pregabalin (LYRICA) capsule (reduced dose)
  50 mg, Oral, SEE ADMIN INSTRUCTIONS, for 1 dose, Nursing to give 60 minutes before time of surgery, Pre-op
MMPM Post-Op #1: Acetaminophen

Multimodal Pain Management Postop Manage My Version▼ ▲

▼ Undetermined Risk Patient

▼ Multimodal Pain Management Undetermined Risk

- Unknown risk of adverse effects from pain meds
- Consider reduced dose option if decreased renal function, risk of sleep apnea or weight <51kg

▼ Acetaminophen

- acetaminophen (TYLENOL) tablet
  1,000 mg, Oral, EVERY 8 HOURS (3 times per day), for 3 days, Start 8 hours after pre-op dose, Post-op/Phase II

- acetaminophen (TYLENOL) soln/susp
  1,000 mg, Oral, EVERY 8 HOURS (3 times per day), for 3 days, Start 8 hours after pre-op dose, Post-op/Phase II

- acetaminophen (TYLENOL) suppository
  650 mg, Rectal, EVERY 6 HOURS (4 times per day), for 3 days, Start 8 hours after pre-op dose, Post-op/Phase II
**NSAIDs**

- **celecoxib (CELEBREX) capsule (standard dose)**
  200 mg, Oral, 2 TIMES DAILY, for 6 doses, If urine output is less than 240ml/8 hours (30ml/hr) or if signs of bleeding, contact MD and hold, Post-op/Phase II

- **celecoxib (CELEBREX) capsule (reduced dose)**
  100 mg, Oral, 2 TIMES DAILY, for 6 doses, If urine output is less than 240ml/8 hours (30ml/hr) or if signs of bleeding, contact MD and hold, Post-op/Phase II

- **ibuprofen (ADVIL, MOTRIN) tablet (standard dose)**
  600 mg, Oral, EVERY 8 HOURS (3 times per day), for 9 doses, If urine output is less than 240ml/8 hours (30ml/hr) or if signs of bleeding, contact MD and hold. Administer with food or snack, Post-op/Phase II

- **ibuprofen (ADVIL, MOTRIN) tablet (reduced dose)**
  400 mg, Oral, EVERY 8 HOURS (3 times per day), for 9 doses, If urine output is less than 240ml/8 hours (30ml/hr) or if signs of bleeding, contact MD and hold. Administer with food or snack, Post-op/Phase II

- **naproxen (NAPROSYN) tablet (standard dose)**
  500 mg, Oral, 2 TIMES DAILY WITH BREAKFAST & DINNER, for 6 doses, If urine output is less than 240ml/8 hours (30ml/hr) or if signs of bleeding, contact MD and hold, Post-op/Phase II

- **naproxen (NAPROSYN) tablet (reduced dose)**
  250 mg, Oral, 2 TIMES DAILY WITH BREAKFAST & DINNER, for 6 doses, If urine output is less than 240ml/8 hours (30ml/hr) or if signs of bleeding, contact MD and hold, Post-op/Phase II

- **ketorolac injection x ONE dose followed by celecoxib (CELEBREX) (standard dose)**

- **ketorolac injection x ONE dose followed by celecoxib (CELEBREX) (reduced dose)**

- **ketorolac x ONE dose followed by ibuprofen (ADVIL, MOTRIN) (standard dose)**

- **ketorolac x ONE dose followed by ibuprofen (ADVIL, MOTRIN) (reduced dose)**

- **ketorolac injection x ONE dose followed by naproxen (NAPROSYN) (standard dose)**

- **ketorolac injection x ONE dose followed by naproxen (NAPROSYN) (reduced dose)**

- **ketorolac injection x FOUR doses followed by celecoxib (CELEBREX)**

- **ketorolac injection x FOUR doses followed by celecoxib (CELEBREX) (reduced dose)**

- **ketorolac x FOUR doses followed by ibuprofen (ADVIL, MOTRIN) (standard dose)**

- **ketorolac x FOUR doses followed by ibuprofen (ADVIL, MOTRIN) (reduced dose)**

- **ketorolac injection x FOUR dose followed by naproxen (NAPROSYN) (standard dose)**

- **ketorolac injection x FOUR dose followed by naproxen (NAPROSYN) (reduced dose)**
**Gabapentinoids**

Consider use if anticipated moderate to severe postop pain. Titrate to benefit. Reduced dose recommended if any one of the following:
- age ≥ 64
- decreased renal function
- risk of sleep apnea
- neuraxial opiate used
If ≥ 2 risk factors present, consider omitting

- **Gabapentin (NEURONTIN) capsule (standard dose)**
  200 mg, Oral, 3 TIMES DAILY, for 3 days. Hold for over-sedation, dizziness or visual disturbance and contact MD, Post-op/Phase II

- **Gabapentin (NEURONTIN) capsule (reduced dose)**
  100 mg, Oral, 3 TIMES DAILY, for 3 days. Hold for over-sedation, dizziness or visual disturbance and contact MD, Post-op/Phase II

- **Pregabalin (LYRICA) capsule (standard dose)**
  100 mg, Oral, 2 TIMES DAILY, for 3 days. Hold for over-sedation, dizziness or visual disturbance and contact MD, Post-op/Phase II

- **Pregabalin (LYRICA) capsule (reduced dose)**
  50 mg, Oral, 2 TIMES DAILY, for 3 days. Hold for over-sedation, dizziness or visual disturbance and contact MD, Post-op/Phase II

**Oral Opioids**

- **OxyCODONE (ROXICODONE) tablet (standard dose)**
  5-20 mg, Oral, EVERY 3 HOURS PRN. Pain. First dose must be the lowest dose, can titrate to effective dose by repeat of lowest dose every 60 minutes prn pain, may not exceed maximum dose ordered per interval. Use Pasero Sedation Scale, Post-op/Phase II

- **OxyCODONE (ROXICODONE) tablet (reduced dose)**
  2.5-10 mg, Oral, EVERY 3 HOURS PRN. Pain. First dose must be the lowest dose, can titrate to effective dose by repeat of lowest dose every 60 minutes prn pain, may not exceed maximum dose ordered per interval. Use Pasero Sedation Scale, Post-op/Phase II

- **Morphine (MSIR) tablet (standard dose)**
  7.5-30 mg, Oral, EVERY 3 HOURS PRN. Pain. First dose must be the lowest dose, can titrate to effective dose by repeat of lowest dose every 60 minutes prn pain, may not exceed maximum dose ordered per interval. Use Pasero Sedation Scale, Post-op/Phase II

- **Morphine (MSIR) tablet (reduced dose)**
  7.5-15 mg, Oral, EVERY 3 HOURS PRN. Pain. First dose must be the lowest dose, can titrate to effective dose by repeat of lowest dose every 60 minutes prn pain, may not exceed maximum dose ordered per interval. Use Pasero Sedation Scale, Post-op/Phase II

- **HYDROMorphine (DILAUDID) tablet (standard dose)**
  2-8 mg, Oral, EVERY 3 HOURS PRN. Pain. First dose must be the lowest dose, can titrate to effective dose by repeat of lowest dose every 60 minutes prn pain, may not exceed maximum dose ordered per interval. Use Pasero Sedation Scale, Post-op/Phase II

- **HYDROMorphine (DILAUDID) tablet (reduced dose)**
  1-2 mg, Oral, EVERY 3 HOURS PRN. Pain. First dose must be the lowest dose, can titrate to effective dose by repeat of lowest dose every 60 minutes prn pain, may not exceed maximum dose ordered per interval. Use Pasero Sedation Scale, Post-op/Phase II
MMPM Post-Op #4: IV Opioids

**IV Opioids**

- **morphine injection (standard dose)**
  2-8 mg, Intravenous, EVERY 2 HOURS PRN, Pain, If oral route not an option. Slow IV push, not faster than 2mg/minute. First dose must be lowest dose, titrate to effective dose by repeat of lowest dose every 30 minutes prn pain, may not exceed maximum dose ordered per interval. Use Pasero Sedation Scale., Post-op/Phase II

- **morphine injection (reduced dose)**
  1-2 mg, Intravenous, EVERY 1 HOUR PRN, Pain, If oral route not an option. Slow IV push, not faster than 2mg/minute. First dose must be lowest dose, titrate to effective dose by repeat of lowest dose every 30 minutes prn pain, may not exceed maximum dose ordered per interval. Use Pasero Sedation Scale., Post-op/Phase II

- **HYDROmorphine (DILAUDID) injection (standard dose)**
  0.25-1 mg, Intravenous, EVERY 2 HOURS PRN, Pain, If oral route not an option. Slow IV push, not faster than 0.3mg/minute. First dose must be lowest dose, titrate to effective dose by repeat of lowest dose every 30 minutes prn pain, may not exceed maximum dose ordered per interval. Use Pasero Sedation Scale., Post-op/Phase II

- **HYDROmorphine (DILAUDID) injection (reduced dose)**
  0.2-0.4 mg, Intravenous, EVERY 1 HOUR PRN, Pain, If oral route not an option. Slow IV push, not faster than 0.3mg/minute. First dose must be lowest dose, titrate to effective dose by repeat of lowest dose every 30 minutes prn pain, may not exceed maximum dose ordered per interval. Use Pasero Sedation Scale., Post-op/Phase II
How can we help?

Knowledge + Tools = Better patient care!
PCA Orders 2015-17, Ortho Floor

PCA Shortage

Education begins
# Top 15 PCA Prescribers, 2015 vs. 2016

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Total PCA orders from Top 15 prescribers: 811
## Top 15 PCA Prescribers, 2015 vs. 2016

<table>
<thead>
<tr>
<th>PROVIDER</th>
<th>DEPARTMENT</th>
<th>2015</th>
<th>2016</th>
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<tr>
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<td>Urology</td>
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**Total PCA orders from Top 15 prescribers**: 811 in 2015, 258 in 2016.

That’s a 68% reduction in PCA orders, in one year.
In less than two years, hospital-wide PCA use decreased by 52%.
Naloxone Usage at PAMC, 2016-2018

% of inpatients receiving opioids that required naloxone
Goal ≤ 0.5%
(2018-2022 Goal < 0.33%)

Karen Thompson, PharmD

Naloxone Usage

0.5
0.63
Post-op orders changed 10/4/16
0.43
0.46
0.42
0.32
0.27
0.39
0.34

1Q2016 2Q2015 3Q2016 4Q2016 1Q2017 2Q2017 3Q2017 4Q2017 1Q2018
What does this mean?

Less opioid + more multimodals =

Better pain management *and* fewer risks!

Everybody wins!
Good baseline pain control—minimize the ups and downs!
  - More orals, less IV
  - More reliance on longer-acting IV drugs (for breakthrough pain)
  - Do NOT assume that a PCA is always the best way to control acute pain.

MULTIMODAL ANALGESIA!
  - Minimizes side effects of any one drug class
  - There are many options for neuropathic pain, and most of them serve more than one function.
  - Opioids should never be the first line agent for pain management.
Shifting gears...

What should you know about buprenorphine and naltrexone?
Opioid Blockade!
Drugs to watch out for...

- Partial agonists, agonist-antagonists
  - Buprenorphine (Subutex, Suboxone, Sublocade)

- Pure opioid antagonists
  - Naloxone (Narcan): short-acting
  - Naltrexone (Revia, Vivitrol): long-acting
Buprenorphine

- **Subutex** = buprenorphine
- **Suboxone** = buprenorphine + naloxone (deterrent only)
- **Sublocade** = buprenorphine, monthly SQ injection

- Extremely high affinity for *mu*-opioid receptor. Almost nothing displaces it.

- For other opioids to work well, must wait several days for buprenorphine to clear.

- For procedure/surgery with significant post-op pain that will require opioids, recommend TRANSITION to another opioid 5-7 days prior to procedure.

- For minor procedures or planned vaginal delivery, recommend continuing buprenorphine.

- If a patient is on buprenorphine, other opioids will be much less effective. If buprenorphine is on board, only options are:
  - More buprenorphine (variable efficacy)
  - Non-opioid drugs
  - Very high dose opioids (not recommended)
Naloxone (Narcan)

- **Short-acting opioid antagonist**
- **Half-life = 60-90 minutes**
- Rapidly displaces all other opioids from the *mu*-opioid receptor. Completely blocks activity at receptor.
Naltrexone

- Long-acting opioid antagonist (like Narcan, but lasts much longer)

- Clearance depends on formulation

- As long as naltrexone is on board, opioids will have almost no effect.

- Only option is non-opioid drugs!
Naltrexone (cont.)

- **Revia** = naltrexone (PO)
- **Vivitrol** = naltrexone (monthly IM injection)
- **Contrave** = naltrexone + wellbutrin (PO)

- Oral (Revia, Contrave): Takes 24-48 hours to clear
- IM injection (Vivitrol): Takes one month to clear

- As long as naltrexone is on board, opioids will have no effect.
  - *Only* option is non-opioid drugs!

- When naltrexone wears off, patient may be very sensitive to effects of opioids.
Questions?

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