LOYOLA UNIVERSITY CHICAGO

STRITCH SCHOOL OF MEDICINE

Sub- I Wards– Pain Discussion

- Outline:
- Few points from 2022 CDC Clinical Practice Guideline for Prescribing Opioids for Pain
- Review analgesics according to WHO 3-Step Pain Ladder
- Overview Opioid Pharmacology
- Long-Acting Opioids
- Review definitions
- Patient Controlled Analgesia

2022 CDC Clinical Practice Guideline for Prescribing Opioids for Pain

- Detailed presentation during PCM4

- Pain Management Approach
  - First **nonpharmacologic** therapy
  - Then **nonopioid** pharmacologic therapy
  - **Opioid** therapy only if benefits outweigh risks
    - When starting opioid tx prescribe IMMEDIATE RELEASE instead of extended release/long acting (ER/LA) opioids

- Assess response to management via function, not just a “number”

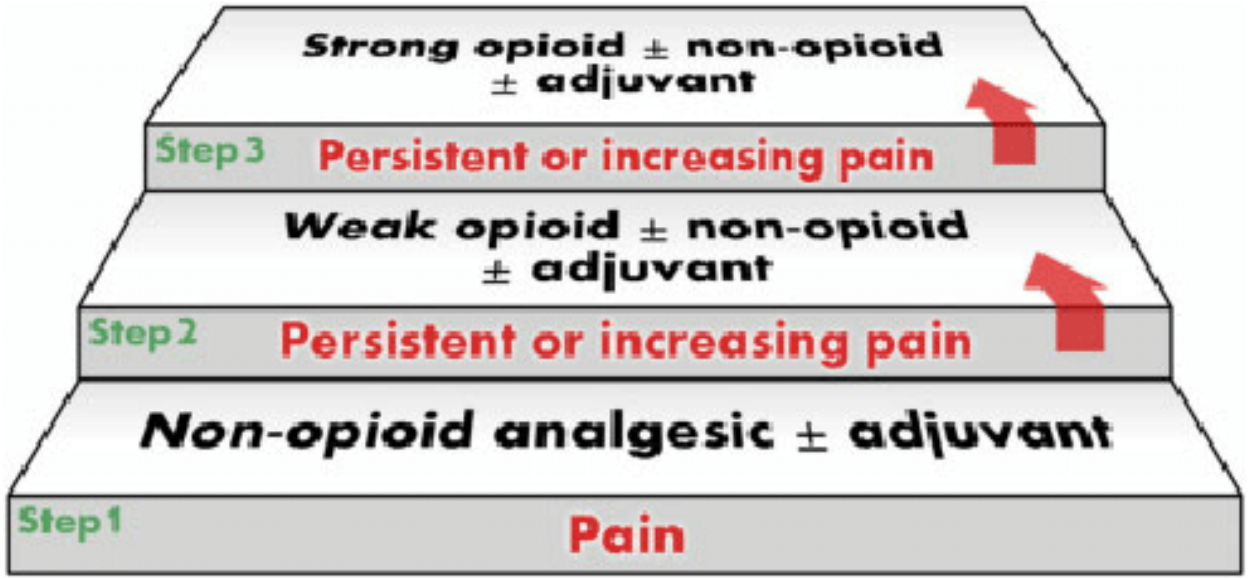
2022 CDC Clinical Practice Guideline for Prescribing Opioids for Pain

- Evaluate risk/benefit of opioids for acute pain
  - Provide prescriptions for enough opioid for estimated duration of severe pain
    - Usually < 7 days

Sub- I Wards– Pain Discussion

- Outline:
  - Highlights of 2016 CDC Guidelines for the Management of Chronic Pain
  - Review analgesics according to WHO 3-Step Pain Ladder
  - Overview Opioid Pharmacology
  - Long-Acting Opioids
  - Review definitions
  - Patient Controlled Analgesia

WHO 3-Step Pain Ladder



WHO 3 step ladder

- Step 1
  - Acetaminophen
  - Nonsteroidals
  - Aspirin

Question:

- What is the maximum daily dose of acetaminophen?

- What is the maximum daily dose of acetaminophen for a patient with liver disease (cirrhosis)?

Who 3 step ladder

- Step 2
  - Codeine +acetaminophen
    - T#2, T #3, T#4
  - Hydrocodone + acetaminophen 5mg/325mg
    - Norco
    - Vicodin
    - Lortab
    - Hycet
  - Oxycodone + acetaminophen
    - Percocet
  - Tramadol
    - Ultram

What is max dose of combination drugs based upon?

Who 3 Step Ladder

- Step 3
  - Morphine
  - Hydromorphone
    - Dilaudid
  - Oxycodone
  - Methadone
  - Fentanyl

Who 3 Step Ladder

- Step 3 – Routes of Administration
  - Morphine — PO, IV, epidural, intrathecal
  - Hydromorphone — PO, IV
    - Dilaudid
  - Oxycodone — PO
  - Methadone — PO, IV
  - Fentanyl — Transdermal, IV, transmucosal, epidural, intrathecal

Some Pointers re Step 3 Opioids

- Morphine
  - Avoid in ESRD
- Hydromorphone
  - Respect potency
- Oxycodone
- Methadone
  - PO Long ½ life
    - takes several days to reach steady-state concentration
    - full analgesic effect not achieved for up to 7 days after starting or increasing dose
  - Prolongs QT
- Fentanyl
  - Lipophilic
  - IV quick onset, rapid redisribution

List the following from analgesics from least to most potent

- Tramadol
- Hydromorphone
- Oxycodone
- Hydrocodone
- Codeine
- Morphine

Least to most potent

- Codeine
- Tramadol
- Morphine = Hydrocodone
- Oxycodone
- Hydromorphone

Equianalgesic Table

Equianalgesic Dose

Drug Name	Oral (mg)	Parenteral (mg)
Morphine	30	10
Hydromorphone	7.5	1.5
Oxycodone	20	N/A
Hydrocodone	30	N/A

Starting Doses of Opioids?

Drug Name	Oral (mg)	Parenteral (mg)
Morphine	30	10
Hydromorphone	7.5	1.5
Oxycodone	20	N/A
Hydrocodone	30	N/A

Tip – remember “morphine 5mg PO”

Then use equianalgesic table

What is starting dose of oxycodone?

$$\text{Morphine 5mg PO} \times \frac{\text{oxycodone 20mg PO}}{\text{morphine 30mg PO}} = \text{Oxycodone 3.3mg PO}$$

What is starting dose of PO hydromorphone?

Morphine 5mg PO x $\frac{\text{hydromorphone 7.5mg PO}}{\text{morphine 30mg PO}}$ = hydromorphone 1.25mg PO

Drug Name	Oral (mg)	Parenteral (mg)
Morphine	30	10
Hydromorphone	7.5	1.5
Oxycodone	20	N/A
Hydrocodone	30	N/A

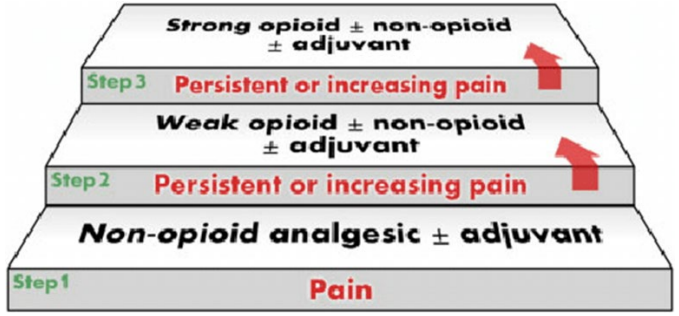
Drug Name	Oral (mg)	Parenteral (mg)
Morphine	30	10
Hydromorphone	7.5	1.5
Oxycodone	20	N/A
Hydrocodone	30	N/A

- What is starting dose of IV hydromorphone?

- Morphine 5mg PO$\times \frac{\text{Hydromorphone 7.5mg PO}}{\text{Morphine 30mg PO}}$ = Hydromorphone 1.25mg

- Hydromorphone 1.25mg PO $\times \frac{\text{Hydromorphone 1.5mg IV}}{\text{Hydromorphone 7.5mg PO}}$ = Hydromorphone 0.25mg IV

Adjuvant analgesics



Type of drug	Daily recommended dose	Route	Indications
Antidepressants	Amitriptyline 10 to 25–150 mg/day Nortriptyline 25 mg/day Desipramine 10 to 25–150 mg/day Venlafaxine 37.5–150 mg/day Duloxetine 30–120 mg/day	Oral	Neuropathic pain
Anticonvulsants	Gabapentin 1200–3600 mg/day Pregabalin 150–600 mg/day	Oral	Neuropathic pain
Corticosteroids	Dexamethasone 4–24 mg/day	Oral/iv.	Neuropathic, bone, visceral pain, brain edema, spinal cord compression
Lidocaine	Patches 5%/day Bolus 1–2 mg/kg in 15–30 min. If effective, 2 mg/kg/h	Topical iv.	Neuropathic pain
NMDA antagonists	Ketamine: 0.04–0.3 mg/kg/h Amantadine Magnesium 1 g/day	iv./oral/sc./sl./topical Oral iv.	Neuropathic pain Tolerance to opioids
Bisphosphonates	Pamidronate 60–90 mg every 2–4 weeks Zoledronic acid 4 mg every 3–4 weeks Ibandronate 6 mg × 3 days, then every 3–4 weeks	iv.	Osteolytic bone pain

iv.: Intravenous; sc.: Subcutaneous; sl.: Sublingual.
Data taken from [12,43,50,51].

Sub- I Wards– Pain Discussion

- Outline:
  - Highlights of 2016 CDC Guidelines for the Management of Chronic Pain
  - Review analgesics according to WHO 3-Step Pain Ladder
  - Overview Opioid Pharmacology
  - Long-Acting Opioids
  - Review definitions
  - Patient Controlled Analgesia

Opioid Basic Pharmacology

- Always start with short acting /immediate release opioid

Onset of Action and Peak Effect of Immediate Release Opioid

- Oral
  - Onset ~30 minutes
  - Peak Effect ~60-90 minutes
  - Duration ~4 hours

- IV
  - Onset ~10 minutes
  - Peak Effect ~30 minutes
  - Duration ~2-3 hours

Dose Escalation

- For ongoing ***moderate to severe pain*** increase opioid doses by **50-100%**

- For ongoing **mild to moderate pain** increase by **25-50%**

Sub- I Wards– Pain Discussion

- Outline:
  - Highlights of 2016 CDC Guidelines for the Management of Chronic Pain
  - Review analgesics according to WHO 3-Step Pain Ladder
  - Overview Opioid Pharmacology
  - Long-Acting Opioids
  - Review definitions
  - Patient Controlled Analgesia

Pain Managment

- Extended release/long acting (ER/LA) opioids are NOT for acute pain management

- ER/LA opioids risks may outweigh benefits for chronic (nonmalignant) pain management

- CDC Guideline - When starting opioid tx prescribe IMMEDIATE RELEASE instead of ER/LA opioids

Long Acting Opioids

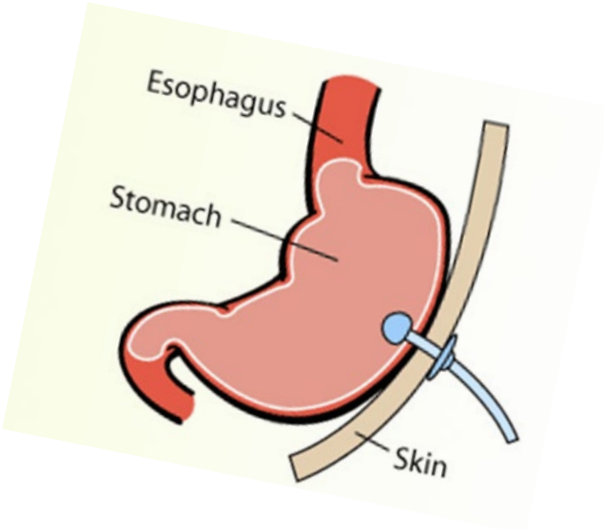
- Morphine
  - MS Contin, Kadian, Avinza
- Oxycodone
  - Oxycontin
- Hydromorphone
  - Exalgo
- Fentanyl Transdermal
  - Duragesic

Long Acting Opioids

- For opioid tolerant patients
  - Pt taking at least
    - 60 mg oral morphine/day
    - 30 mg oral oxycodone/day
    - 8 mg oral hydromorphone/day
    - or equianalgesic dose of another opioid
    - **<u>for one week or longer</u> (FDA)**

- For management of moderate to severe pain when a continuous, around-the-clock opioid analgesic is needed for **<u>an extended period of time</u>**

What if a patient has dysphagia and cannot swallow pills or has a G-tube or Dobhoff tube?



Question

- What is prescribed for a patient who is on a long-acting opioid for times when they have pain despite the LA drug?

Breakthrough dosing

- Immediate Release/Short Acting Opioid

- Breakthrough dosing
  - 10-15% of total 24 hour dose

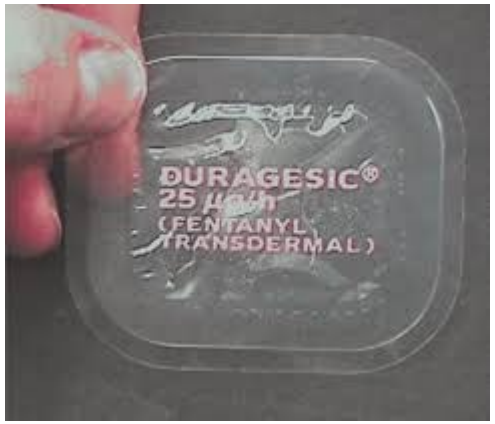
  - Morphine ER 30mg PO q 12 hours
    - Breakthrough 10-15% of 60mg
      - 6mg PO q 4 hours PRN

Acute Pain in an opioid tolerant patient?

- Uncontrolled pain must be controlled via **short acting** oral or IV opiates BEFORE the start/titration of a long acting agent

More on transdermal fentanyl

- Onset of action?
  - 18-24 hours
- Patch strengths
  - 12, 25, 50, 75, 100mcg/hr
- Dosed (changed)
  - q 72 hours



Transdermal Fentanyl

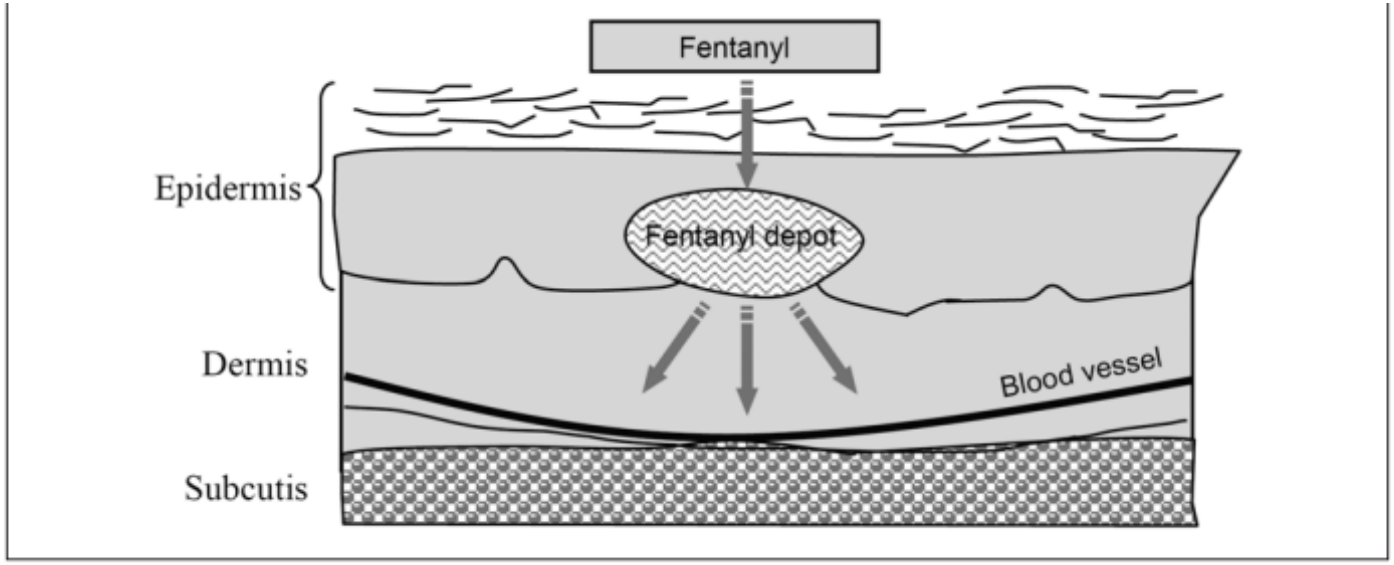


Figure 1: Cross section of skin, demonstrating that fentanyl, given its high lipid solubility, readily enters the epidermal lipids and forms a depot at the dermal-epidermal junction. This slowly dissolves in the hydrophilic dermis and enters the cutaneous blood circulation.

Principle: Levy's Principle for determining transdermal fentanyl dose

- What dose of ORAL MORPHINE in a 24 hour period is equianalgesic to fentanyl 25mcg/hr patch?
  - 50mg

- Levy's Principle: Fentanyl patch strength in micrograms/hr is approximately equal to half total dose of morphine in milligrams given over 24 hours

  - Example: 200 mg oral morphine over 24 hours =

  ~ fentanyl 100 mcg/hr transdermal patch

Sub- I Wards– Pain Discussion

- Outline:
  - Highlights of 2016 CDC Guidelines for the Management of Chronic Pain
  - Review analgesics according to WHO 3-Step Pain Ladder
  - Overview Opioid Pharmacology
  - Long-Acting Opioids
  - Review definitions
  - Patient Controlled Analgesia

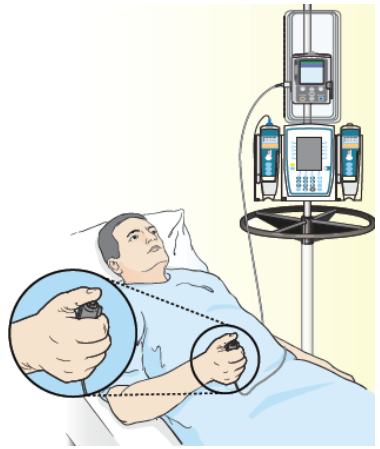
Definitions

- Opioid Dependence
  - Withdrawl symptoms with abrupt cessation of opioid
- Opioid Tolerance
  - Increased doses required for maintained effect
- Opioid Addiction
  - 4 Cs
    - **C**raving
    - **C**ompulsive Use
    - Lack of **C**ontrol
    - **C**ontinued Use Despite Harm

Sub- I Wards– Pain Discussion

- Outline:
  - Highlights of 2016 CDC Guidelines for the Management of Chronic Pain
  - Review analgesics according to WHO 3-Step Pain Ladder
  - Overview Opioid Pharmacology
  - Long-Acting Opioids
  - Review definitions
  - Patient Controlled Analgesia

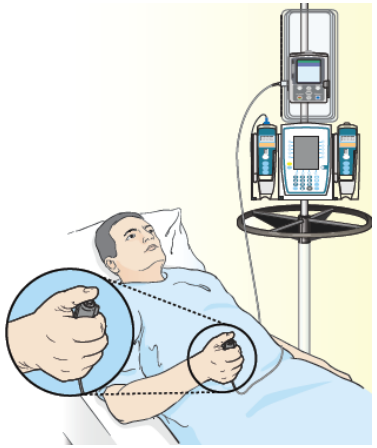
Patient Controlled Analgesia (PCA)



- Primary advantage: shorten interval from time of patient-defined need to time of actual analgesic administration
- Indications: post-operative pain, sickle cell crisis, cancer pain

- Reasonable levels of consciousness and cognitive function are required to effectively manage PCA

PCA Order Set

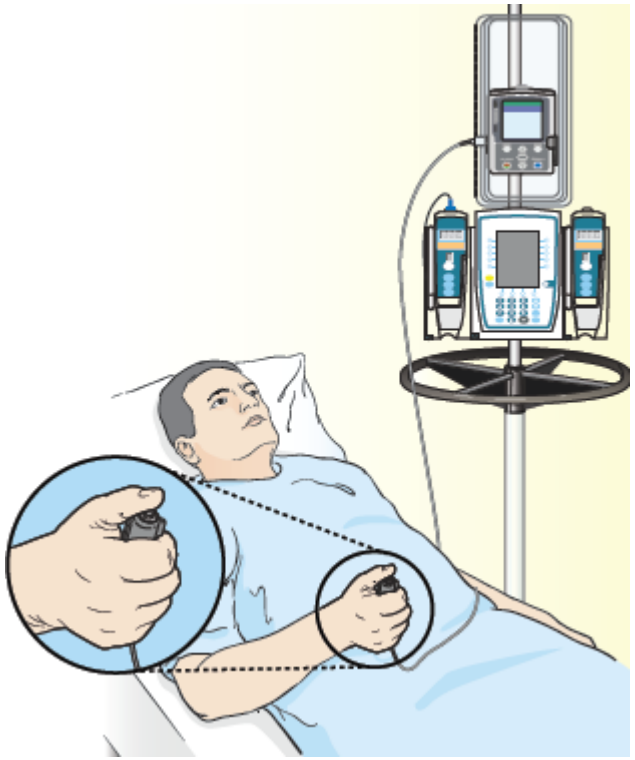


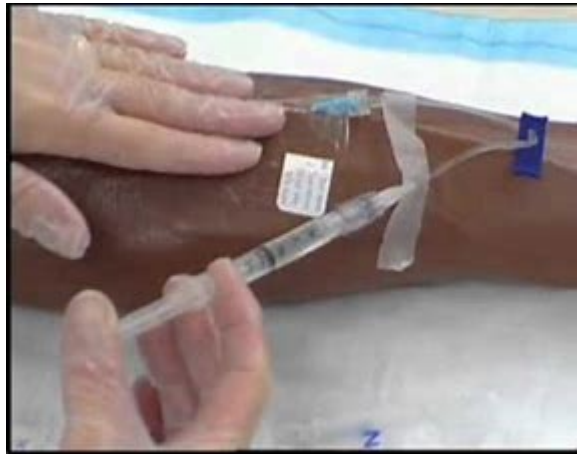
- Opioid
- Concentration
- Demand Dose
- Lockout
- 4 hour limit
- Basal rate
- Loading Dose

Patient Controlled Analgesia

- Opioid
- Concentration
  - *Higher concentration for patients who are opioid tolerant*
- Demand Dose
  - *Dose opioid administered*
- Lockout
  - *Frequency with which demand dose can be administered*
- 4 hour limit
  - *The pump can provide only the amount set within the time frame. The amount includes both basal rate and demand doses. The limit may be set lower for patients with multiple co-morbid conditions and set higher for opioid tolerant patients.*
  - *This is a safety feature and needs to be titrated on an individual basis and frequent re-assessments.*
- Basal rate
  - Continuous infusion
  - Do NOT start a basal rate on an opioid naïve patient
- Loading Dose
  - *Optional clinician bolus given postoperatively or during a pain crisis to bring the pain down to a manageable level*
    - *~2x demand dose*

Loading dose





Patient Controlled Analgesia

- Only the patient can push the button
- Do NOT start a basal rate on an opioid naïve patient
- For a patient on a basal rate, titrate demand dose to control “uncontrolled” pain
  - Adjusted basal rate only ~20-24 hours

Practice

- Cases linked to Skills Session on LUMEN
- Extra practice questions (developed per suggestion of Student Review Panel)
- A few questions now

Case 1 Summary

- 30s year old man, healthy, presents with acute low back pain, 10/10, walking/function limited by pain
- What can you prescribe for the pain?
  - Ketorlac 30mg IV
  - Gabapentin 100mg PO
  - Hydrodocone/acetaminophen PO 5/325
  - Morphine 1mg IV
  - Morphine 2mg IV
  - Morphine 5mg IV
  - Hydromorphone 2mg IV

Equianalgesic Table

Equianalgesic Dose

Drug Name	Oral (mg)	Parenteral (mg)
Morphine	30	10
Hydromorphone	7.5	1.5
Oxycodone	20	N/A
Hydrocodone	30	N/A

If willing to give morphine 2mg IV → what dose of hydromorphone

$$\text{Morphine 2mg IV} \times \frac{\text{hydromorphone 1.5mg}}{\text{morphine 10mg IV}} = 0.3\text{mg IV}$$

Drug Name	Oral (mg)	Parenteral (mg)
Morphine	30	10
Hydromorphone	7.5	1.5
Oxycodone	20	N/A
Hydrocodone	30	N/A

If pt administered 2mg IV hydromorphone → what dose of morphine is that equivalent to?

$$\text{Hydromorphone 2mg IV} \times \frac{\text{Morphine 10mg IV}}{\text{Hydromorphone 1.5mg IV}} = \text{13mg IV morphine}$$

Drug Name	Oral (mg)	Parenteral (mg)
Morphine	30	10
Hydromorphone	7.5	1.5
Oxycodone	20	N/A
Hydrocodone	30	N/A

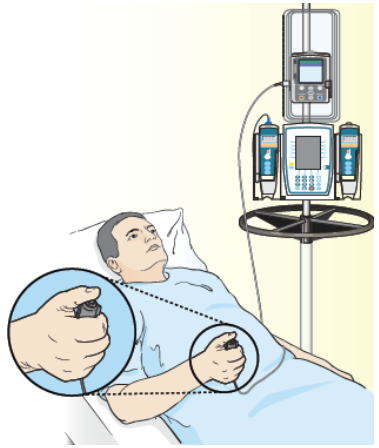
What if the patient is

- 80 year old woman
  - 88 pounds
  - Creatinine 1.8

  What dose of morphine IV?

Case: Opioid naiive patient post op PCA orders

Patient Controlled Analgesia



- Opioid morphine
- Concentration 1mg/ml, 5mg/ml
- Demand Dose 1mg
- Lockout q 10-15 minutes
- 4 hour limit
  - *The limit means that the pump can provide only the amount set within the time frame. The amount includes both the basal rate and the demand doses. The limit may be set lower for patients with multiple co-morbid conditions and set higher for opioid tolerant patients. This is again a safety feature and needs to be titrated on an individual basis and frequent re-assessments.*
- Basal rate NO!
- Loading Dose 2x demand q ~30 minutes

LUMEN – Ward Sub I
great short article on PCAs

Pain Evaluation And Control

Case Contents

- Learning Objectives

Cases with Answers

- Case #1
- Case #2

Pain Management Table

Patient Controlled Analgesia

Powerpoint Summary of CDC Guidelines for Prescribing Opiates for Pain Control

Pain PPT

References

Previous

Updated 6/16/21

thapril2008article107.pdf 1 / 2 100%

1

2

KEY CLINICAL QUESTIONS

What is the best method of treating acutely worsened chronic pain?

By Jeanie Youngwerth, MD

KEY POINTS

1. Pain is the most common symptom in the hospitalized patient, yet it is often undertreated.
2. PCAs may obtain better acute pain relief and satisfaction than conventional analgesia without an increase in side effects.
3. Basal rates on PCAs should be reserved for patients with chronic opioid use to reduce the risk of oversedation.
4. Adverse effects of opioids are similar for different modes of administration.
5. The most common PCA mishaps arise from operator-related errors.
6. Incomplete cross tolerance allows for lower doses of opioid use when switching from one agent to another.

THE BOTTOM LINE

There is no one accepted way to treat acute on chronic pain. However, a PCA is a reasonable choice in a patient with cancer.

ADDITIONAL READING

- Gordon DB, Dahl JL, Miaskowski C,

Case

A 69-year-old female with metastatic ovarian cancer and chronic pain syndrome presented to the hospital with seven days of progressively worsening abdominal pain. The pain had been similar to her chronic cancer pain but more severe. She has acute renal failure secondary to volume depletion from poor intake. A CT scan of the abdomen and pelvis reveal progression of her cancer with acute pathology. What is the best method of treating this patient's pain?

Overview

Pain is pandemic. It is the most common reason patients seek healthcare.[1] Almost one-third of Americans will experience severe chronic pain at some point in their lives. Every year, approximately 25 million Americans experience acute pain and 50 million experience chronic pain. Only one in four patients with pain receives appropriate therapy and control of their pain.

Pain is the most common symptom experienced by hospitalized adults.[2] Acute or chronic pain can be particularly challenging to treat because these

opioid pharmacologic concept of minimum effective analgesic concentration (MEAC).[4,5] The MEAC is the smallest serum opioid concentration at which pain is relieved. The dose-response curve to opioids is sigmoidal such that minimal analgesia is achieved until the MEAC is reached, after which minute increases in opioid concentrations produce analgesia, until further increases produce no significant increased analgesic effect.

PCAs allow individualized dosing and titration to achieve the MEAC, with small incremental doses administered whenever the serum concentration falls below the MEAC. A major goal of PCA technology is to regulate drug delivery to rapidly achieve and maintain the MEAC.

Advantages of PCAs

- More individual dosing and titration of pain medications to account for inter-individual and intra-individual variability in the response to opioids;
- Negative feedback control system, an added safety measure to avoid respiratory depression. As patients become too sedated

demand (or incremental) dose, lockout interval, nurse-initiated bolus dose, and choice of opioid.

Basal rate: The continuous infusion of opioid set at an hourly rate. Most studies that compare PCA use with and without basal rates (in postoperative patients) do not show improved pain relief or sleep with basal rates.[11] Basal rates have been associated with increased risk of sedation and respiratory depression.[12]

The routine use of basal rates is not recommended initially, unless a patient is opioid-tolerant (i.e., on chronic opioid therapy). For patients on chronic opioids, their 24-hour total opioid requirement is converted by equianalgesic dosing to the basal rate. Steady state is not achieved for eight to 12 hours of continuous infusion; therefore, it is not recommended to change the basal rate more frequently than every eight hours.[13]

Demand dose: The dose patients provide themselves by pushing the button. Studies on opioid-naïve patients using morphine PCAs have shown that 1 mg IV morphine was the optimal

Type here to search 46°F Rain

Key Take-aways

- For Acute or Chronic Pain → opioids only after thorough risk/benefit assessment
- If using opioids
  - Begin with short acting agents
- Long acting opioids
  - For management of moderate to severe pain when a continuous, around-the-clock opioid analgesic is needed for extended period of time
- When beginning PCA on opioid naiive patient, do NOT start a basal rate

Thank you

- Please email me with any questions!