

# Demystifying Opioid Conversion Calculations

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## Learning Objectives

After this presentation, you should be able to:

- ❖ Determine the relative strengths of different opioids by comparing their Oral Morphine Equivalents (OME)
- ❖ State the pros and cons of different opioids
- ❖ List the steps to convert the dose of one opioid to another opioid
- ❖ Perform the calculations to convert the dose of one opioid to another opioid
  - Simple conversion, Fentanyl patch, Methadone and IV infusion doses
- ❖ Communicate the important counseling points of Methadone to patients/caregivers
- ❖ List adjuvants therapies for neuropathic pain and bone pain



## Disclaimer

- ❖ Every patient is different and has different needs.
- ❖ This presentation helps provide the framework.
- ❖ Keep in mind that when calculating a conversion to a different opioid, this is just a starting point and the dose may need to be adjusted after a few days.
- ❖ Must follow up with the patient and adjust doses accordingly.



## Reasons To Switch Opioids

- ❖ Simplify pain medication regimen
- ❖ Current regimen is ineffective
- ❖ Dose of current regimen is very high
- ❖ Patient is unable to swallow
- ❖ Cost



## Simplify pain medication regimen

- ❖ Reduce confusion
- ❖ Improve compliance and convenience
- ❖ Patient is taking 4 or more PRNs in a 24 hour period – consider a long acting opioid
- ❖ Ideal regimen: 1 long acting opioid and 1 short acting opioid for breakthrough pain
- ❖ Provide a steady baseline



## Current regimen is ineffective / Dose of current regimen is very high

- ❖ Overtime patients may build up a tolerance to a particular opioid with chronic therapy
- ❖ The patient may be experiencing a different type of pain (neuropathy or bone pain)
- ❖ Switching to another opioid may help
- ❖ Some opioids are stronger than others
  - Can compare opioids by using their Oral Morphine Equivalent (OME)



## Oral Morphine Equivalent (OME)

	Drug	Multiply current dose by this factor to equal oral Morphine dose
weaker  stronger	Tramadol	0.1
	Codeine	0.15
	Morphine oral (tab, liquid)	1
	Hydrocodone	1
	Oxycodone	1.5
	Morphine IM, IV, SC	3
	Hydromorphone oral	4
	Hydromorphone IM, IV, SC	20
	Methadone	See methadone guidelines
	Fentanyl patch	25mcg/hr patch roughly = 50mg Oral Morphine/day
	Buprenorphine patch	10mcg/hr patch = 25mg Oral Morphine/day



## How to Use the OME Table

Drug	Multiply current dose by this factor to equal oral Morphine dose
Tramadol	0.1
Codeine	0.15
Morphine oral (tab, liquid)	1
Hydrocodone	1
Oxycodone	1.5
Morphine IM, IV, SC	3
Hydromorphone oral	4
Hydromorphone IM, IV, SC	20

- ❖ Same opioid, but IR to ER = don't need to multiply by factor
  - Morphine IR tab to Morphine ER tab = 1:1
  - Morphine IR tab 120mg = Morphine ER tab 120mg
- ❖ Stronger opioid to Morphine = multiply by factor
  - Oxycodone to Morphine oral → multiply Oxycodone dose by 1.5
  - Oxycodone 30mg = Morphine IR tab 45mg
- ❖ Morphine to stronger opioid = divide by factor
  - Morphine oral to Oxycodone → divide Morphine dose by 1.5
  - Morphine IR tab 45mg = Oxycodone 30mg



# How to Use the OME Table

Drug	Multiply current dose by this factor to equal oral Morphine dose
Tramadol	0.1
Codeine	0.15
Morphine oral (tab, liquid)	1
Hydrocodone	1
Oxycodone	1.5
Morphine IM, IV, SC	3
Hydromorphone oral	4
Hydromorphone IM, IV, SC	20

Oxycodone to Hydromorphone oral?

- ❖ Convert Oxycodone to OME (multiply by 1.5)
  - Oxycodone 15mg = OME (Morphine) 22.5 mg
- ❖ Convert OME to target opioid (Hydromorphone)
  - Morphine is weaker than Hydromorphone → divide by factor
  - OME (Morphine) 22.5mg / 4 = 5.625mg
  - Hydromorphone comes in 2, 4, 8mg tablets → closest dose is 6mg (2mg + 4mg tablet)



# Patient is Unable to Swallow

- ❖ Can crush immediate release tablets
- ❖ Can use liquid formulations sublingually
- ❖ Methadone - only long acting opioid where the tablets can be crushed and the liquid formulation can be used sublingually
- ❖ Can use MS Contin rectally

Available as a Liquid	
Morphine	Codeine/acetaminophen
Oxycodone	Hydrocodone/acetaminophen
Hydromorphone	Oxycodone/acetaminophen
Methadone *(long acting)	

Volumes are too large for SL use; Monitor total amount of acetaminophen per day



## Cost effective alternative - Liquids

- ❖ Most commonly used - Morphine concentrate (Roxanol), Oxycodone concentrate (Oxyfast) and Hydromorphone (Dilaudid) liquid

Drug	Strength	Equivalent Doses	AWP Cost (15 day supply)
Morphine concentrate	20mg/mL	20mg (1mL) q4h	\$70
Hydromorphone	1mg/mL	5mg (5mL) q4h	\$270
Oxycodone concentrate	20mg/mL	15mg (0.75mL) q4h	\$490

- ❖ Use tablets (whole or crushed) PO/PR whenever possible
- ❖ Morphine conc (Roxanol) is the most cost effective of the liquids
- ❖ Reserve Oxycodone conc (Oxyfast) and Hydromorphone if allergic to Morphine and cannot swallow/use tablets (whole/crushed)



## Cost effective alternative – Short Acting Opioids

Drug	Dose	AWP Cost (15 days)	Cost-Effective Alternative	AWP Cost (15 days)
Oxycodone/acetaminophen (Percocet)	10/325mg q6h	\$215	Oxycodone 10mg q6h	\$40
Vicodin (brand – Hydrocodone/acetaminophen)	5/ <u>300mg</u> q6h	\$115	Hydrocodone/acetaminophen (generic) 5/ <u>325mg</u> q6h	\$40
Tapentadol (Nucynta IR tab)	75mg q6h	\$490	Morphine IR tab 30mg q4h	\$95
Fentanyl buccal (Fentora, Abstral)	200mcg q8h	\$4475		
Fentanyl SL lozenge (Actiq)	200mcg q8h	\$1130	Morphine conc 20mg q8h	\$70
Fentanyl SL spray (Subsys)	100mcg q6h	\$4240		



## Cost effective alternative – Long Acting Opioids

Approximate cost of a 15 day supply of equivalent doses (based upon AWP)

Drug	Doses	Cost	\$\$\$
Hydromorphone ER (Exalgo)	32mg q24h	\$815	
Tapentadol ER (Nucynta ER)	150mg q12h	\$535	
Hydrocodone ER (Zohydro ER)	50mg q12h	\$380	
Morphine ER capsule (Kadian, Avinza)*	100mg q24h	\$290	
Oxycodone ER (Oxycontin)*	40mg q12h	\$290	
Oxymorphone ER (Opana)*	20mg q12h	\$255	
Morphine ER tablet (MS Contin)	60mg q12h	\$160	
Fentanyl patch (Duragesic)	50mcg q72h	\$140	
Methadone tab (Dolophine)	5mg q12h	\$15	

\* Only some select strengths have become generically available, still relatively high cost



## Things to Consider When Switching Opioids

- ❖ Dosage form
- ❖ Opioid allergies
- ❖ Cost



# Available Dosage Forms

Drug	Immediate Release	Extended Release	Oral Liquid	Suppository	Injectable
Buprenorphine	X	X			X
Fentanyl	X	X			X
Hydromorphone	X	X	X	X	X
Methadone	X (acts as long acting)		X		X
<b>Morphine</b>	X	X	X	X	X
Oxycodone	X	X	X		
Oxymorphone (Opana)	X	X			X
Tapentadol (Nucynta)	X	X			
Tramadol (Ultram)	X	X			
Codeine/Acetaminophen	X		X		
Hydrocodone/acetaminophen	X	X (without acetaminophen)	X		
Oxycodone/acetaminophen	X		X		

Immediate Release formulation only:  
 Hydrocodone/Ibuprofen (Vicoprofen), Oxycodone/Aspirin (Endodan, Percodan), Tramadol/Acetaminophen (Ultracet)

Meperidine – avoid in chronic pain management due to toxic metabolites associated with seizures  
 (Available as immediate release, oral liquid and injectable)



# Drug intolerance vs pseudo allergy vs true opioid allergy

- ❖ Drug intolerance – complaints due to the side effects
  - Nausea/vomiting, hallucinations, etc
- ❖ Pseudoallergy – result of histamine release

True Opioid Allergy Symptoms	Pseudoallergy Symptoms
Severe hypotension	Mild hypotension
Rash	Itching, hives, flushing (no rash)
Difficulty breathing	Sweating
Angioedema	

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>❖ Choose an opioid in a different chemical class</li> <li>❖ Use caution and close monitoring</li> </ul> | <ul style="list-style-type: none"> <li>❖ Choose more potent opioid</li> <li>❖ Avoid Codeine and Morphine</li> <li>❖ Consider an antihistamine</li> </ul> |
|--|--|



## Cost

- ❖ Management of patient's symptoms should come first before cost
- ❖ However, try to utilize cost-effective alternatives when possible
- ❖ Long-acting opioids \$
  - Methadone <<<< Fentanyl, MS Contin << other long acting opioid
- ❖ Liquid opioids \$
  - Morphine conc << Hydromorphone << Oxycodone conc
  - Utilized tablets (whole, crushed, rectally) when possible



## HPS Opioid Conversion Guidelines

- ❖ Simple opioid conversion – excludes Fentanyl, Methadone and IV infusion
  - Same opioid
  - Different opioids
- ❖ Conversion from an opioid to Fentanyl patch
- ❖ Conversion from an opioid to Methadone
- ❖ Conversion from an opioid to IV infusion



## Disclaimer

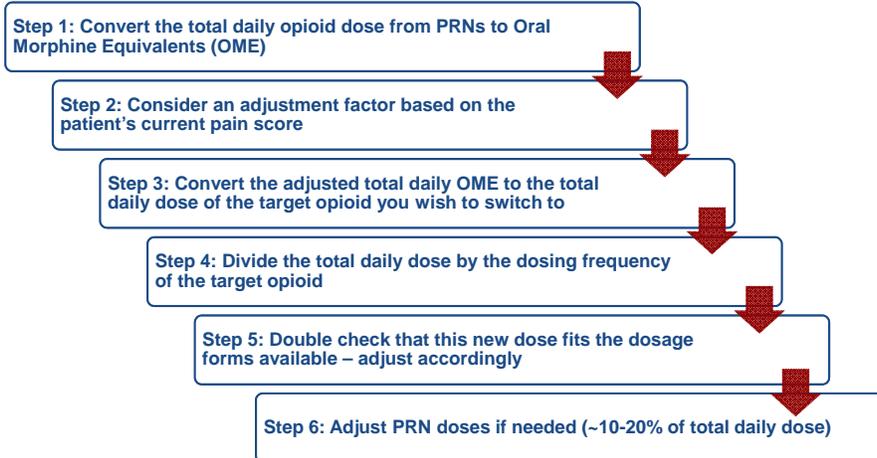
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- ❖ Keep in mind that when calculating a conversion to a different opioid, this is just a starting point and the dose may need to be adjusted after a few days.
- ❖ Must follow up with the patient and adjust doses accordingly.



## Simple Opioid Conversions – Same Opioid (excludes Fentanyl, Methadone and IV infusions)



## HPS Opioid Conversion Guideline (excludes Fentanyl, Methadone and IV infusions)



## Case Study 1

- ❖ MK is a 80 year old male with lung cancer
- ❖ He is currently taking
  - Morphine IR tab 30 mg q4hours PRN
- ❖ In the last 24 hours he has taken 6 doses
- ❖ He is currently rating his pain a 5 out of 10
  
- ❖ Good candidate for a long-acting opioid (MS Contin)
  - Using more than 4 PRNs in a 24 hour period



## Case Study 1: Step 1

Step 1: Convert the total daily opioid dose from PRNs to Oral Morphine Equivalents (OME)

Drug	Multiply current dose by this factor to equal oral Morphine dose
Tramadol	0.1
Codeine	0.15
Morphine oral (tab, liquid)	1
Hydrocodone	1
Oxycodone	1.5
Morphine IM, IV, SC	3
Hydromorphone oral	4
Hydromorphone IM, IV, SC	20
Methadone	See methadone guidelines
Fentanyl patch	25mcg/hr patch roughly = 50mg Oral Morphine/day
Buprenorphine patch	10mcg/hr patch = 25mg Oral Morphine/day



## Case Study 1: Step 1

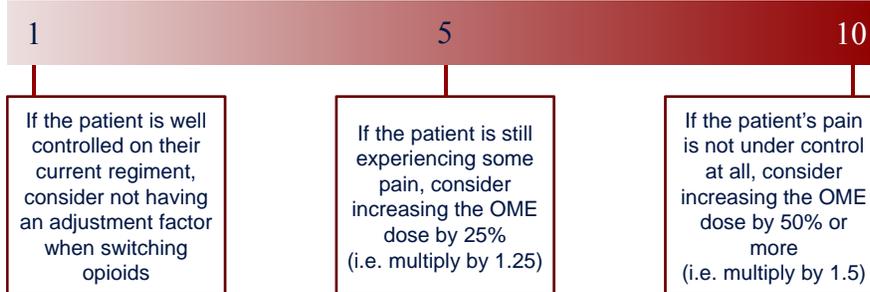
Step 1: Convert the total daily PRN opioid dose to Oral Morphine Equivalents (OME)

- ❖ Case Study 1
  - Morphine IR tab 30mg q4hours PRN
  - In the last 24 hours he has taken 6 doses
- ❖ Total daily amount of oral Morphine being taken
  - $30\text{mg} \times 6 \text{ doses} = 180\text{mg}$
- ❖ Convert oral Morphine to OME
  - Same opioid, same route, no conversion needed
  - 180mg daily OME



## Case Study 1: Step 2

**Step 2: Consider an adjustment factor based on the patient's current pain score**



### Case Study 1

- Patient's score = 5 out of 10
- Multiply OME by 1.25
  - ✦  $180\text{mg total daily OME} \times 1.25 = 225\text{ mg adjusted total daily OME}$



## Case Study 1: Step 3 and 4

**Step 3: Convert the adjusted total daily OME to the total daily dose of the target opioid you wish to switch to**

- ❖ Adjusted total daily OME = 225 mg
- ❖ Switching to MS Contin, do not need to convert
- ❖ Total daily dose of MS Contin = 225mg

**Step 4: Divide the total daily dose by the dosing frequency of the target opioid**

- ❖ MS Contin is dosed q12 hours (2 doses per day)
- ❖  $225\text{mg} / 2 = 112.5\text{ mg BID}$



## Case Study 1: Step 5

**Step 5: Double check that this new dose fits the dosage forms available  
– adjust accordingly**

- ❖ From previous step: MS Contin 112.5 mg BID was calculated
- ❖ MS Contin comes in the following strengths:
  - 15mg, 30mg, 60mg, 100mg, 200mg
- ❖ Closest doses are 100mg BID vs 115mg BID
- ❖ If dosage does not fit tablet size, may consider rounding the dose based on the patient's needs



## Case Study 1: Step 6

**Step 6: Adjust PRN doses if needed (~10-20% of total daily dose)**

- ❖ If MS Contin 115mg BID was chosen:
  - Current total daily dose = 230mg
- ❖ 10-20% of total daily dose for PRN dose
  - $230\text{mg} \times 0.1 = 23\text{mg}$
  - $230\text{mg} \times 0.2 = 46\text{mg}$
- ❖ Current PRN dose is Morphine IR tab 30mg q4h
- ❖ Completed order
  - MS Contin 115mg BID
  - Morphine IR tab 30mg q4h PRN



## Simple Opioid Conversions – Different Opioids (excludes Fentanyl, Methadone and IV infusions)



### Case Study 2

- ❖ MK is a 80 year old male with lung cancer
- ❖ He is currently taking
  - **Oxycodone** IR tab 15 mg q4hours PRN
  - MS Contin 115mg BID
- ❖ In the last 24 hours he has taken 6 doses
- ❖ This is currently controlling his pain
  
- ❖ Need to adjust the long-acting opioid (MS Contin)
  - Using 6 PRNs in a 24 hour period



## Case Study 2: Step 1

Step 1: Convert the total daily opioid dose from PRNs to Oral Morphine Equivalents (OME)

- ❖ Case Study 2
  - Oxycodone IR tab 15mg q4hours PRN
  - In the last 24 hours he has taken 6 doses
- ❖ Total daily amount of Oxycodone being taken
  - 15mg x 6 doses = 90mg

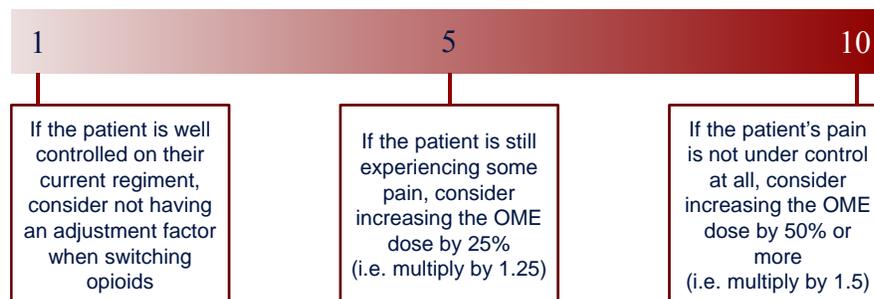
Drug	Multiply current dose by this factor to equal oral Morphine dose
Morphine oral (tab, liquid)	1
Oxycodone	1.5

- ❖ Convert Oxycodone to OME
  - Oxycodone is 1.5x stronger than Morphine
  - 90mg Oxycodone x 1.5 = 135 mg total daily OME



## Case Study 2: Step 2

Step 2: Consider an adjustment factor based on the patient's current pain score



Case Study 2

- Pain is under control under current regimen
- No adjustment factor needed
- Adjusted total daily OME = 135mg



## Case Study 2: Step 3 and 4

**Step 3: Convert the adjusted total daily OME to the total daily dose of the target opioid you wish to switch to**

- ❖ Adjusted total daily OME = 135mg
- ❖ Switching to MS Contin, do not need to convert
- ❖ Additional total daily dose of MS Contin = 135mg
- ❖ Currently taking MS Contin 115mg BID (230mg daily), need to add 135mg
- ❖ Total daily dose = 230mg + 135mg = 365 mg

**Step 4: Divide the total daily dose by the dosing frequency of the target opioid**

- ❖ MS Contin is dosed q12 hours (2 doses per day)
- ❖  $365 \text{ mg} / 2 = 182.5 \text{ mg BID}$



## Case Study 2: Step 5

**Step 5: Double check that this new dose fits the dosage forms available – adjust accordingly**

- ❖ From previous step: MS Contin 182.5 mg BID was calculated
- ❖ MS Contin comes in the following strengths:
  - 15mg, 30mg, 60mg, 100mg, 200mg
- ❖ Closest doses: 175mg BID or 190mg BID  
 $100\text{mg}+60\text{mg}+15\text{mg}$        $100\text{mg}+60\text{mg}+30\text{mg}$
- ❖ If dosage does not fit tablet size, may consider rounding the dose based on the patient's needs



## Case Study 2: Step 6

**Step 6: Adjust PRN doses if needed (~10-20% of total daily dose)**

❖ If MS Contin 190mg BID was chosen:

- Current total daily dose = 380mg

❖ 10-20% of total daily dose for PRN dose

- $380\text{mg} \times 0.1 = 38\text{mg Morphine}$
- $380\text{mg} \times 0.2 = 76\text{mg Morphine}$

Drug	Multiply current dose by this factor to equal oral Morphine dose
Morphine oral (tab, liquid)	1
Oxycodone	1.5

❖ Current PRN dose is Oxycodone IR tab 15mg q4h

- $38\text{mg Morphine} / 1.5 = 25\text{mg Oxycodone}$
- May consider changing Oxycodone dose to 25mg q4h PRN

❖ Completed order:

- MS Contin 190mg BID
- Oxycodone IR tab 25mg q4h PRN



## Opioid Conversions with Fentanyl Patch



## Concerns with Fentanyl Patches

- ❖ Slow onset of action (may take up to 16 hours to achieve clinical effects)
- ❖ Slow clearance of drug from the subcutaneous tissue when patch is removed (up to 15 hours)
- ❖ Potential for over-dosage/toxicity if previous patch is not removed when new patch is applied
- ❖ Difficult to titrate to a therapeutic dose
- ❖ Limited available strengths of patches and need for multiple patches simultaneously
  - Increased cost, increased compliance problems, and increased risk for medication errors
- ❖ Dosage increases not recommended more often than every 6 days (after the initial dosage increase)



## Concerns with Fentanyl Patches cont.

- ❖ Very high cost
- ❖ Over-used in patients who can take PO medication
- ❖ Drug absorption may be significantly altered, leading to under-dosage or toxicity in the following conditions:
  - Cachexia
  - Febrile illness
  - The use of external heat sources (electric blankets, heating pads)
  - Diaphoresis
  - Skin site variations (hair, skin abrasion, cuts, broken skin, atrophic skin changes due to aging)



## Conversion From An Opioid TO Fentanyl Patch

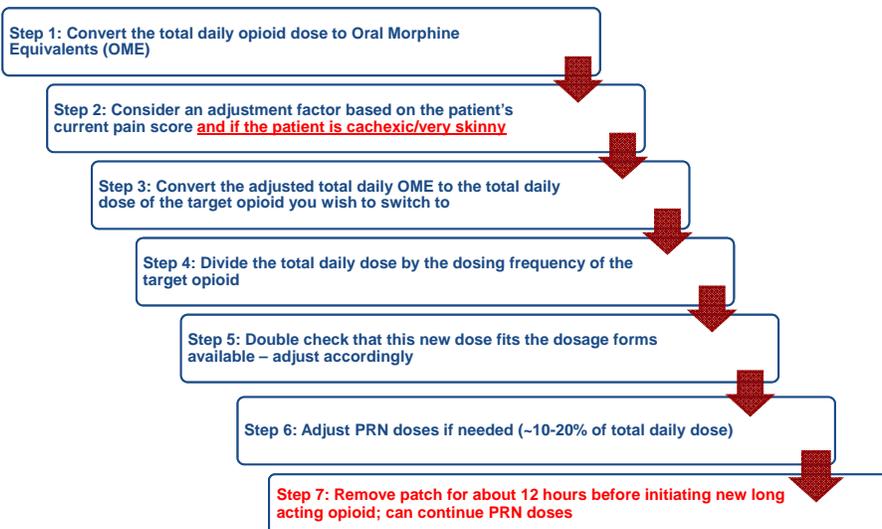
- ❖ Use only for converting **FROM** other opioid medications **TO** the Fentanyl patch.
- ❖ This chart should **NOT** be used to convert from Fentanyl patch to other opioids.
- ❖ Consider continuing previous opioid dose for **12 hrs after application of initial patch** (slow onset)

Current Analgesic	Daily Dosage (mg/d)			
Oral morphine	60-134	135-224	225-314	315-404
IM/IV morphine	10-22	23-37	38-52	53-67
Oral oxycodone	30-67	67.5-112	112.5-157	157.5-202
IM/IV oxycodone	15-33	33.1-56	56.1-78	78.1-101
Oral codeine	150-447	448-747	748-1047	1048-1347
Oral hydromorphone	8-17	17.1-28	28.1-39	39.1-51
IV hydromorphone	1.5-3.4	3.5-5.6	5.7-7.9	8-10
IM meperidine	75-165	166-278	279-390	391-503
Oral methadone	20-44	45-74	75-104	105-134
IM methadone	10-22	23-37	38-52	53-67
	↓	↓	↓	↓
<b>Recommended Fentanyl Dose</b>	25 mcg/h	50 mcg/h	75 mcg/h	100 mcg/h

1. Reference: Duragesic (Fentanyl Transdermal System) Full Prescribing information, Janssen Pharmaceuticals, Inc., 2003.  
[http://www.duragesic.com/assets/pdf/duragesic\\_0.pdf](http://www.duragesic.com/assets/pdf/duragesic_0.pdf)



## Conversion FROM Fentanyl Patch TO Another Opioid



## Conversion from Fentanyl - Step 1

Step 1: Convert the total daily opioid dose to Oral Morphine Equivalents (OME)

Drug	Multiply current dose by this factor to equal oral Morphine dose
Morphine oral (tab, liquid)	1
Fentanyl patch	25mcg/hr patch roughly = 50mg Oral Morphine/day

### ❖ Examples

- Fentanyl 25mcg/hr patch ~ 50mg oral Morphine/day
- Fentanyl 50mcg/hr patch ~ 100mg oral Morphine/day
- Fentanyl 100mcg/hr patch ~ 200mg oral Morphine/day



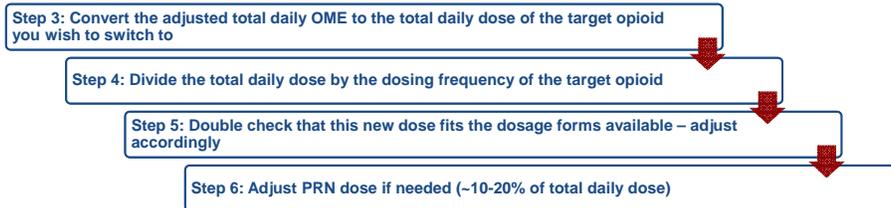
## Conversion from Fentanyl - Step 2

Step 2: Consider an adjustment factor based on the patient's current pain score  
**and if the patient is cachexic/very skinny**

- ❖ Fentanyl creates a deposit of drug in the subcutaneous fat
- ❖ Patients who are cachexic/very skinny may not be getting the full effect of the Fentanyl dose
- ❖ Consider decreasing OME by 25 – 75% based on the patient



## Conversion from Fentanyl - Steps 3-6



- ❖ Same as other opioids



## Conversion from Fentanyl - Step 7

**Step 7: Remove patch for about 12 hours before initiating new long acting opioid; can continue PRN doses**

- ❖ Fentanyl creates a deposit of drug in the subcutaneous fat
- ❖ Slow clearance of drug from the subcutaneous tissue when patch is removed (up to 15 hours)
- ❖ Recommend removing the patch before the patient goes to bed at night and initiating new long acting opioid the following morning
- ❖ Can continue using the PRN doses through this transition period



## Opioid Conversions with Methadone



## Advantages of Methadone

- ❖ Long-acting (8-12hrs)<sup>2</sup>
- ❖ Good absorption<sup>3,4</sup> - Both oral and sublingual administration
- ❖ Hospice favorable dosage forms - Liquid and crushable tablets
- ❖ Relatively safe in patients with renal/liver impairment<sup>2</sup>
- ❖ Great for opioid rotation
  - Synthetic opioid with distinct chemical structure<sup>5</sup>
- ❖ Very good efficacy toward neuropathic pain
- ❖ Very inexpensive



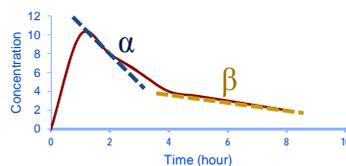
## Concerns with Methadone

- ❖ Negative connotation - Opioid detox. use, drug addicts
- ❖ Respiratory depression
  - May persist longer than the analgesic effects during initial dosage period
  - Little difference in risk among opioids with equi-analgesic doses<sup>2</sup>
    - ✦ Less common with oral opioid therapy
  - Tolerance to respiratory depression develops rapidly<sup>6</sup>
- ❖ QT prolongation with high doses
  - Potential for serious arrhythmia (torsade de pointes) - Rare
  - Not usually associated with low dose methadone (< 200mg/day)<sup>7</sup>
  - No clinical confirmation of this effect with oral methadone; only IV<sup>8</sup>
- ❖ No high strength tablets available - 5mg and 10mg
- ❖ Unfamiliar Kinetics - Biphasic analgesic duration



## Methadone Distribution & Biphasic Analgesic Duration

- ❖ Extensive tissue distribution and drug-tissue binding
  - Only "unbound" drug is active
- ❖ Plasma half-life ( $T_{1/2}$ ) is bi-phasic
  - Initial or alpha phase: 2 – 4hr (distribution phase – about 5 days)
    - ✦ Reservoir of drug is created during distribution phase
  - Maintenance or beta phase: 10 – 40 hrs (big differences between individuals)
- ❖ Duration of analgesic effect is biphasic – correlates with above
  - 4 -6 hours when therapy initiated
  - 8 -12 hours after repeated routine dosing  
(average of 5 days to reach steady-state level, longer for liver impairment)

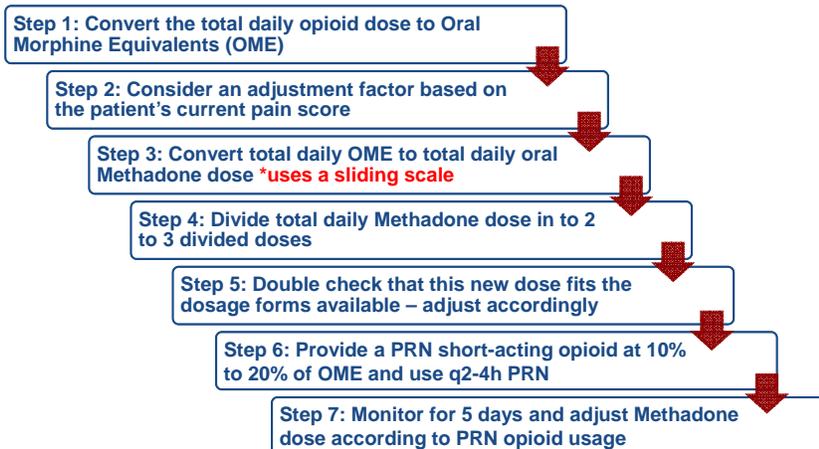


## Important Counseling Points with Methadone

- ❖ When first switching to Methadone or adjusting the dose, the pain relief may not last the full 8 or 12 hours until around day 5
- ❖ You may need to use more of the breakthrough pain medication during these first 5 days and this is perfectly normal
- ❖ We can adjust the dose and/or dosing frequency of Methadone on day 5 if it is not enough or wears off before the 12 hour mark
- ❖ It may take a few adjustments to find the right dose for you



## HPS Opioid Conversion Guideline for Methadone



## Case Study 3

- ❖ JJ is a 75 year old female with colon cancer with neuropathy
- ❖ Currently taking:
  - Morphine IR 15mg q2hrs PRN (5 doses in last 24 hrs)
  - OxyContin 30mg BID
- ❖ Has persistent complaints of severe burning, shooting pains in her legs, despite current pain meds
- ❖ Pain scale rating 5 out of 10
  
- ❖ Good candidate for Methadone
  - Complaining of neuropathy
  - OxyContin is an expensive long acting opioid



## Case Study 3 – Step 1

### Step 1: Convert the total daily opioid dose to Oral Morphine Equivalents (OME)

- ❖ She is currently taking
  - Morphine IR 15mg q2hrs PRN (5 doses in last 24 hrs)
  - OxyContin 30mg BID
- ❖ Can incorporate all routine and PRNs taken in last 24 hours into Methadone conversion
  - Total daily Morphine =  $15\text{mg} \times 5 = 75\text{mg}$
  - Total daily Oxycodone =  $30\text{mg} \times 2 = 60\text{mg}$
  - Oxycodone to OME =  $60\text{mg} \times 1.5 = 90\text{mg}$
- ❖ Total OME from all opioids =  $75\text{mg} + 90\text{mg} = 165\text{mg}$



## Case Study 3 – Step 2

**Step 2: Consider an adjustment factor based on the patient's current pain score**

- ❖ Total daily OME = 165mg
- ❖ She is currently complaining of pain 5 out of 10
- ❖ Adjustment factor = 1.25
  
- ❖ Total daily OME 165mg x 1.25 = 206.25mg adjusted total daily OME



## Case Study 3 – Step 3

**Step 3: Convert total daily OME to total daily oral Methadone dose \*uses a sliding scale**

Total Daily Oral Morphine Dose	Morphine to Methadone Ratio
<100	5:1
101 – 750mg	10:1
751 – 1500mg	12:1
>1500mg	15:1

A red arrow points from the left towards the row in the table corresponding to a morphine dose of 101 – 750mg and a 10:1 ratio.

- ❖ Adjusted total daily OME = 206 mg
- ❖ Based on the table, use 10:1 Morphine to Methadone ratio
- ❖ 206mg adjusted total daily OME / 10 =20.6mg total daily Methadone dose

9 Adapted from MD Anderson Cancer Center guidelines, Ayonrinde and Bridge (Med J Aust 2000), and Ripamonti (Cancer Pain & Palliative Care 1999)



## Case Study 3 – Step 4 and 5

### Step 4: Divide total daily Methadone dose in to 2 to 3 divided doses

- ❖ Total daily Methadone dose = 20.6 mg
- ❖ Can divide Methadone dose by 2 or 3
  - If large total daily dose of Methadone, consider starting with TID
- ❖  $20.6\text{mg Methadone} / 2 = 10.3\text{ mg Methadone BID}$

### Step 5: Double check that this new dose fits the dosage forms available – adjust accordingly

- ❖ Methadone tabs come in 5mg and 10mg strengths
- ❖ Methadone liquid comes in 5mg/5ml, 10mg/5ml and 10mg/ml
- ❖ For this patient - can chose 10mg tablets BID initially
  - If patient is unable to swallow later, can either crush the tablets or use the 10mg/ml solution (10mg = 1mL)



## Case Study 3 – Step 6 and 7

### Step 6: Provide a PRN short-acting opioid at 10% to 20% of OME and use q2-4h PRN

- ❖ Adjusted total OME = 206mg
- ❖ 10% of adjusted total OME =  $206 \times 0.1 = 20.6\text{mg Morphine}$
- ❖ Patient is currently taking Morphine IR tab 15mg q2hr PRN
  - Morphine IR tabs only come in 15mg and 30mg
  - Closest doses: 15mg vs 22.5mg (one and half of the 15mg tab)
- ❖ Completed order: Methadone 10mg BID with Morphine IR tab 15mg q2hr PRN

### Step 7: Monitor for 5 days and adjust Methadone dose according to PRN opioid usage

- ❖ Methadone takes 5 days to fully distribute
- ❖ Educate patient on Methadone and need for PRNs during first 5 days
- ❖ Keep track of PRNs during this time and adjust Methadone dose accordingly after 5 days



## Converting FROM Methadone TO Another Opioid

- ❖ The time it takes to convert from Methadone to another opioid varies greatly between patients due to the variability of how long it takes Methadone to be eliminated from the body (beta phase ~10-40 hrs)
- ❖ When converting to another opioid, start at a very low routine dose (~20-25% of the total OME) and provide a sufficient short-acting opioid for breakthrough pain during this transition
- ❖ Adjust the dose of the routine opioid every 2-3 days based on the PRNs the patient received



## How soon can the long acting opioid dose be increased?

- ❖ Minimum interval to reach steady state

Drug	Frequency
Fentanyl patch	Initial increase in 3 days, then every 6 days
Methadone	Every 5 days
Morphine ER	Every 2 days
Oxycodone ER	Every 2 days

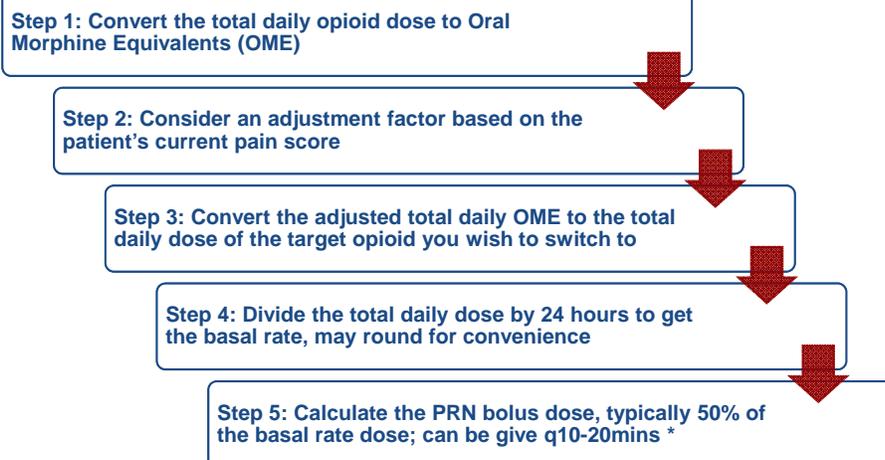
- ❖ Drugs should not be increased more frequently than above



## Opioid Conversions with IV Infusions



### HPS Opioid Conversion Guideline for IV Infusions



\*Different hospices may have their own guideline for calculating PRN bolus dosing and frequency



## Case Study 4

- ❖ KQ is a 90 year old female with Alzheimer's dementia
- ❖ Currently taking:
  - Morphine conc 15mg q2hrs PRN (4 doses in last 24 hrs)
  - MS Contin 100mg BID
- ❖ She is losing her ability to swallow tablets and her pain is worsening (6 out of 10)
- ❖ She is allergic to Methadone
  
- ❖ Provider wants to put her on a Morphine infusion



## Case Study 4 – Step 1

### Step 1: Convert the total daily opioid dose to Oral Morphine Equivalents (OME)

- ❖ She is currently taking
  - Morphine conc 15mg q2hrs PRN (4 doses in last 24 hrs)
  - MS Contin 100mg BID
- ❖ Can incorporate all routine and PRNs taken in last 24 hours into IV infusion conversion
  - Total daily PRN Morphine =  $15\text{mg} \times 4 = 60\text{ mg}$
  - Total daily MS Contin =  $100\text{mg} \times 2 = 200\text{mg}$
- ❖ Total OME from all opioids =  $60\text{mg} + 200\text{mg} = 260\text{mg}$



## Case Study 4 – Step 2

**Step 2: Consider an adjustment factor based on the patient's current pain score**

- ❖ Total daily OME = 260mg
- ❖ He is currently complaining of pain 6 out of 10
- ❖ Adjustment factor = 1.25
  
- ❖ Total daily OME  $260\text{mg} \times 1.25 = 325\text{mg}$  adjusted total daily OME



## Case Study 4 – Step 2

**Step 3: Convert the adjusted total daily OME to the total daily dose of the target opioid you wish to switch to**

- ❖ Adjusted total daily OME = 325mg
- ❖ Going from oral Morphine to IV Morphine

Drug	Multiply current dose by this factor to equal oral Morphine dose
Morphine oral (tab, liquid)	1
Morphine IM, IV, SC	3

- ❖ IV Morphine is 3x stronger than Oral Morphine
  - Need to divide oral Morphine dose by 3
- ❖ Adjusted total daily OME  $325\text{mg} / 3 = 108\text{mg}$  total daily IV Morphine



## Case Study 4 – Step 4 and 5

**Step 4: Divide the total daily dose by 24 hours to get the basal rate, may round for convenience**

- ❖ Total daily IV Morphine = 108mg
- ❖ To get hourly basal rate, divide total daily IV Morphine by 24 hours
- ❖  $108\text{mg} / 24\text{hours} = 4.5\text{mg IV Morphine/hour}$

**Step 5: Calculate the PRN bolus dose, typically 50% of the basal rate dose; can be give q10-20mins \***

- ❖ Basal rate dose = 4.5mg IV Morphine/hour
- ❖ PRN bolus = 50% of basal rate dose
  - $4.5\text{mg} \times 0.5 = 2.25\text{mg IV}$ 
    - ❖ Can round this number to 2mg for convenience
- ❖ Different hospices may have their own guideline for calculating PRN bolus dosing and frequency
- ❖ Completed order:
  - Morphine IV 4.5mg/hr continuous with 2mg q15min PRN breakthrough pain



## Adjuvant Pain Therapies

- ❖ Neuropathic Pain
- ❖ Bone Pain



## Adjuvant for Neuropathic Pain

Opioids	
Tramadol	For Moderate pain – max dose 400mg/day
Methadone	For Severe pain – if the patient is on another opioid, consider rotating to Methadone
Antidepressants	
Tricyclic Antidepressant	Nortriptyline (Pamelor) 25mg qHS; Amitriptyline, Desipramine - Not recommended in older patients
SNRI	Duloxetine (Cymbalta) 60mg daily; Venlafaxine (Effexor)
Bupropion (Wellbutrin)	Bupropion SR 150mg BID
Antiepileptic	
Gabapentin (Neurontin)	100-300mg PO daily on day 1, BID on day 2, then TID; continue to titrate at 300mg intervals. Max daily dose is 3600mg, but increased efficacy unlikely beyond 900mg/day
Pregabalin (Lyrica)	50mg TID; more expensive compared to Gabapentin
Others	Carbamazepine, Valproic acid, Topiramate, Lamotrigine, Phenytoin
Topical (for localized pain)	
Capsaicin, Lidocaine, Ketamine	

## Adjuvant for Bone Pain

- ❖ Suspect bone pain if the patient is receiving high doses of opioids that are not relieving the pain, especially in metastatic cancers

NSAIDs	
Ibuprofen (Advil, Motrin)	400-800 mg PO q6-8h (take with food); max 3200mg/day
Naproxen (Naprosyn, Aleve)	225-500mg PO q8-12h (take with food); max 1500mg/day
Celecoxib (Celebrex)	100mg PO BID; max 400mg/day
Choline magnesium trisalicylate (Trilisate)	500-1500mg PO BID; max 3000mg/day
Salsalate	500-1000mg PO TID; max 3000mg/day
Oral Steroid	
Dexamethasone (Decadron)	2-6mg PO daily-BID; - dose in the morning due to insomnia - less fluid retention/hyperglycemia compared to prednisone - consider adding PPI (Prilosec 20mg daily)

## Conclusion

- ❖ The ability to convert the dose of one opioid to another is an important skill for healthcare providers in the hospice setting, especially when pain is a very common symptom at the end of life.
- ❖ When converting and adjusting opioid doses, make sure to account for individual patient specific factors.
- ❖ Keep in mind that when calculating a conversion to a different opioid, this is just a starting point and the dose may need to be adjusted after a few days.



## Questions?



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