

UNC MEDICAL CENTER GUIDELINE

Opioid Equianalgesic Dosing

This guideline provides information for the conversion between opioid agonists and dosage forms for utilization in the inpatient and clinic settings.

On the next page, Table 1 shows the relative potency of several opioid medications with morphine as the reference medication. Published tables vary in the suggested doses that are equianalgesic. The “Equianalgesic Doses” columns (“Parenteral” and “Oral”) should be used for determining proportionalities to use when calculating opioid conversions.

Due to cross-tolerance, when switching from one opioid to another, the starting dose of the new opioid should be reduced by 25% to 50% of the equianalgesic dose. Round down to account for available strengths. Clinical response should be assessed for each patient in order to determine if dose titration is necessary.

Table 1 Example: A patient is currently receiving 20 mg of IV morphine per day and the prescriber wishes to convert to PO oxycodone.

- 1) Using the IV morphine:PO morphine conversion ratio, convert to PO morphine: **X = 60 mg PO morphine**

$$\frac{20 \text{ mg IV morphine}}{X \text{ mg PO morphine}} = \frac{10 \text{ mg IV morphine}}{30 \text{ mg PO morphine}}$$

- 2) Using the PO morphine:PO oxycodone conversion ratio, convert to PO oxycodone: **X = 40 mg PO oxycodone**

$$\frac{60 \text{ mg PO morphine}}{X \text{ mg PO oxycodone}} = \frac{30 \text{ mg PO morphine}}{20 \text{ mg PO oxycodone}}$$

- 3) Finally, to accommodate for cross-tolerance, reduce the dose by 25%-50%: **40 mg PO oxycodone x 50% = 20 mg PO oxycodone/day**

Table 1: Conversions and Formulations¹⁻⁸

Drug	Equianalgesic Dose		Formulary Products (Formulary restricted shown in italics)	Initial Adult Dosing (opioid naïve)
	Parenteral ^a	Oral		
Buprenorphine	0.4 mg	N/A	<i>Patch: 5, 10, 20 mcg/hr</i>	Topical: 5 mcg/hr patch once every 7 days
Butorphanol	2 mg	N/A	N/A	N/A
Codeine	N/A	200 mg	N/A	N/A
Fentanyl	100 mcg	N/A	Injection: 50 mcg/mL, PCA Patch: 12, 25, 50, 75, 100 mcg/hr	IV (severe pain): 0.35-0.5 mcg/kg q 30-60 min
Hydrocodone	N/A	30 mg	Tablet (w/ APAP): 5 mg/325 mg Elixir (w/ APAP): 2.5 mg/167 mg per 5 mL	PO: 2.5-10 mg q 4-6 hrs
Hydromorphone	1.5 mg	7.5 mg	Injection: 1 mg/mL, PCA Tablet: 2, 4 mg <i>ER tablet: 8, 12, 16 mg</i>	IV: 0.2-1 mg q 2-3 hrs PO: 2-4 mg q 4-6 hrs *Consider lower than calculated doses in opioid-naïve patients*
Levorphanol	N/A	4 mg (acute) 1 mg (chronic)	N/A	N/A
Meperidine	75 mg	300 mg	<i>Injection: 25, 50, 75, 100 mg/mL</i>	12.5-50 mg once for rigors only
Methadone	Caution is advised when converting to methadone due to variability in patient response and delayed peak effect. Multiple methods exist for conversion to methadone including the Plonk Method, Morley-Makin Method, Ayonrinde Method, and the BJR Method. Use should be restricted to clinicians experienced with conversion.		Oral Solution: 5 mg/ 5 mL Tablet: 5, 10 mg	PO: 2.5 mg q 8-12 hrs
Morphine	10 mg	30 mg ^b	Injection: 2, 4, 10, mg/mL, PCA Oral Solution: 20 mg/mL, 30 mg/1.5 mL, 0.2 mg/0.5 mL CR Tablet: 15, 30, 60, 100 mg	IV: 2.5-5 mg q 3-4 hrs PO: 10-30 mg q 4hrs
Nalbuphine	10 mg	N/A	Injection: 10 mg/mL	IV: 10 mg q 3-6 hrs
Oxycodone	N/A	20 mg	Oral Solution: 5 mg/ 5 mL IR Tablet: 5, 20 mg CR Tablet: 10, 20, 40, 80 mg	PO: 5-15 mg q 4-6 hrs (IR); 10 mg q 12 hrs (ER)
Oxymorphone	1 mg	10 mg	ER Tablet: 5, 7.5, 10, 20 mg	PO: 5 mg q 12 hrs
Tapentadol	N/A	100 mg	<i>IR Tablet: 50, 75 mg</i> <i>ER Tablet: 50, 100, 250 mg</i>	PO: 50-100 mg q 4-6 hrs, may give 2 nd dose ≥1 hr after 1 st prn (IR); 50 mg q 12 hrs (ER)
Tramadol	N/A	120 mg	Tablet: 50 mg	PO: 50-100 mg q 4-6 hrs

^a Parenteral refers to injectable routes of administration only (i.e. does not apply to other non-oral routes, such as transdermal, buccal, etc.)

^b Reference product for equianalgesic doses

Table 2: Oral Morphine Milligram Equivalent (MME)¹⁻²

According to the CDC, this table is not to be used for converting between opioids. The purpose is to aid providers in safe opioid prescribing.

To determine MME/day calculate total amount of all the opioids that a patient is currently taking. Multiply using the conversion factors and add all of the products together. If a patient is receiving >50 MME/day, he/she should be monitored and assessed more frequently, considered for dose reductions, and offered a naloxone prescription.

Table 2 Example: A patient is currently taking 1 tablet of 60 mg of Oxycodone ER twice daily and 1 tablet of 5 mg/325 mg hydrocodone/acetaminophen tablets every 6 hours. The prescriber wishes to calculate MME.

1. Using the PO oxycodone:MME conversion factor of 1.5 multiply to convert to MME: **120 mg PO oxycodone X 1.5 = 180 MME**
2. Using the PO hydrocodone:MME conversion factor of 1 multiply to convert to MME: **20 mg PO hydrocodone X 1 = 20 MME**
3. Finally add the 2 MMEs together: **180 MME + 20 MME = 200 MME**
4. This patient should be frequently monitored and assessed, provided a naloxone prescription and considered for an opioid dose reduction.

Opioid	MME Conversion Factor
Codeine	0.15
Fentanyl (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 mg/day	12
Morphine	1
Oxycodone	1.5
Oxymorphone	3

Table 3: Conversion of Oral Morphine to Transdermal Fentanyl^{5,10,11}

This table is only to be used when converting to transdermal fentanyl. Use of this table for conversion from transdermal fentanyl to other opioids can overestimate the new dose and lead to overdosage. It does not require adjustment for cross-tolerance as that is built into the conversion.

Table 3 Example: A patient is currently taking 120 mg of oxycodone daily and the prescriber wishes to convert to transdermal fentanyl.

- 1) Using the PO oxycodone:PO morphine conversion ratio, convert to PO morphine: **X = 180 mg PO morphine / day**

$$\frac{120 \text{ mg PO oxycodone}}{X \text{ mg PO morphine}} = \frac{20 \text{ mg PO oxycodone}}{30 \text{ mg PO morphine}}$$

- 2) Locate the corresponding transdermal fentanyl dosing in mcg/hr in Table 3: **180 mg PO morphine/day = 50 mcg/hr fentanyl patch**

Oral (PO) Morphine (mg/24hrs)	Fentanyl Patch (mcg/hr)
60 - 134	25
135 - 224	50
225 - 314	75
315 - 404	100
405 - 494	125
495 - 584	150
585 - 674	175
675 - 764	200

Note:⁸ Table 3 above is from the Duragesic[®] package insert and the initial transdermal fentanyl doses derived from this chart are likely to be too conservative for ~50% of patients. An alternative conversion ratio of **2 mg oral morphine/day = 1 mcg/hour of transdermal fentanyl** may also be used to convert from oral morphine to transdermal fentanyl and vice versa (see below). Adjustment for cross-tolerance is not needed.

Alternative Conversion: Transdermal Fentanyl to Oral Morphine OR Oral Morphine to Transdermal Fentanyl⁸

- 1) Calculate oral morphine equivalent using the following conversion: 2 mg oral morphine/day = 1 mcg/hour transdermal fentanyl
- 2) Remove the transdermal fentanyl patch.
- 3) For the first 12 hours after patch removal, use only the rescue medication the patient was previously using for breakthrough pain.
- 4) Twelve hours after the patch is removed, start the new morphine regimen at 50% of the calculated dose. Continue to offer a rescue medication for breakthrough pain.
- 5) Twenty-four hours after patch removal, increase to 100% of the calculated morphine dose. The rescue medication may be continued as needed.

Table 4: Conversion of Oral Morphine to Transdermal Buprenorphine^{12,13}

This table is only to be use when converting to transdermal buprenorphine. Note: patients receiving > 80 mg/day of oral morphine are not good candidates for transdermal buprenorphine and alternatives should be considered.

Table 4 Example: A patient is currently taking 60 mg of PO morphine daily and the prescriber wishes to convert to transdermal buprenorphine.

- 1) Locate the corresponding transdermal buprenorphine dosing in mcg/hr in Table 4: **60 mg PO morphine/day = 10 mcg/hr buprenorphine**

Oral Morphine (mg/24hrs)	Buprenorphine Patch (mcg/hr)
< 30	5
30 – 80	10
Note: Taper recommended prior to initiation of buprenorphine patch. See prescribing information for more details.	

Conversion of Transdermal Buprenorphine to Oral Morphine or Other Opioids^{14, 15}

There is no standard conversion for transitioning patients from transdermal buprenorphine to oral morphine or other opioids, as a wide range of equianalgesic ratios have been reported in the literature. If converting patients from transdermal buprenorphine to other oral or IV opioids, the following considerations should be made:

- 1) Buprenorphine and its active metabolite norbuprenorphine have long half lives and may remain present in the body for several days following patch removal. These partial mu agonists/ kappa antagonists may temporarily increase a patient's total opioid requirement by possibly displacing full opioid agonists from the receptor.
- 2) Since the total opioid requirement may be higher for the first 3-5 days following patch removal, it is not recommended to calculate around-the-clock dosages based on prn doses received during this time period.
- 3) When determining starting opioid doses, patients on transdermal buprenorphine should generally be treated as opioid-naïve in the acute care setting.

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