



# Calculating Opioid Dose Conversions

**Introduction** A variety of published conversion tables and online calculators exist to provide clinicians a rough guide for making calculations when switching between different opioid routes or preparations. Listed below are methods for common conversions using standard published conversion ratios. The examples assume a change in drug or route at a time of stable pain control using equianalgesic doses. See [Fast Fact #2](#) about conversions involving transdermal fentanyl; [Fast Fact #75](#) and [Fast Fact #86](#) about methadone

**Caution:** Published values in equianalgesic tables should be considered a rough clinical guide when making dose conversions as substantial inter-individual variation exists. In fact, the very premise of equianalgesic tables may be flawed in that they assume an equal bidirectional ratio when converting routes, when the ratio from oral (PO) to intravenous (IV) morphine for example is different from IV to oral. Hence there is emerging consensus among experts that online calculators that provide a specific ratio to go from opioid X to opioid Y are likely safer and more accurate. Regardless of whether you utilize a table or online calculator, the final prescribed dose needs to account for a patients' age, renal, and hepatic function; their current pain level and opioid side effects such as sedation; prognosis; and care goals.

## Opioid Equianalgesic Conversion Ratios for use with the following examples:

Morphine 10 mg parenteral = Morphine 25 mg oral = Hydromorphone 2 mg parenteral = Hydromorphone 5 mg oral = Hydrocodone 25 mg oral = Oxycodone 20 mg oral (see References 4 and 5).

### **A. Change route, keeping drug the same (e.g. oral to IV morphine)**

*Example: Change 90 mg q12 extended-release morphine to morphine by IV continuous infusion*

1. Calculate the 24-hour current dose:  $90\text{mg q } 12 = 180 \text{ mg morphine}/24 \text{ hours}$
2. Use the oral to parenteral equianalgesic ratio:  $25 \text{ mg PO morphine} = 10 \text{ mg IV Morphine}$  or a 2.5:1 ratio.
3. Calculate new dose using ratios:  $180/2.5 = 72 \text{ mg IV morphine}/24 \text{ hours}$  or 3 mg/hour infusion
4. Some experts recommend starting the new opioid at roughly 75% of the calculated dose to account for inter-individual variation in first pass clearance and safety.
5.  $3 \text{ mg/hr} \times 0.75 = 2.25 \text{ mg/hr}$  or 2 mg/hr infusion would be the closely whole number interval.

### **B. Change drug, keep the same route (e.g. po morphine to po hydromorphone)**

There is individual variability in the ratio between different opioids. Equianalgesic ratios and online calculators only provide a guide or approximations. Depending on age and prior side effects, most experts recommend starting a new opioid at 50-75% of the calculated equianalgesic dose, in the setting of well-controlled pain.

*Change 90 mg q 12 extended-release morphine to oral hydromorphone.*

1. Calculate the 24-hour current dose:  $90 \text{ Q12} \times 2 = 180 \text{ mg PO morphine}/24 \text{ hrs}$
2. Use the equianalgesic ratio:  $25 \text{ mg PO morphine} = 5 \text{ mg PO hydromorphone}$ , which is a 5:1 ratio
3. Calculate new dose using ratios:  $180/5 = 36 \text{ mg oral hydromorphone}/24 \text{ hours}$
4. For this example, reduce dose 50% for cross-tolerance:  $36 \times 0.5 = 18 \text{ mg}/24 \text{ hours} = 3 \text{ mg q4h}$

**C. Changing drug and route (e.g. oral morphine to IV hydromorphone)**

*Change from 90 mg q12 extended-release morphine to IV hydromorphone as a continuous infusion.*

1. Calculate the 24-hour current dose:  $90 \text{ Q12} \times 2 = 180 \text{ mg PO morphine/24 hrs}$
2. Use the equianalgesic ratio of PO to IV morphine:  $25 \text{ mg po morphine} = 10 \text{ mg IV Morphine}$  (or a 2.5 to 1 ratio)
3. Calculate new dose using ratios:  $180/2.5 = 72 \text{ mg IV morphine/24 hours}$
4. Use the equianalgesic ratio of 10 mg IV morphine to 2 mg IV hydromorphone (a 5 to 1 ratio)
5. Calculate new dose using ratios:  $72/5 = 14 \text{ mg IV hydromorphone/24 hours}$
6. Reduce dose 50% for cross-tolerance:  $14 \times 0.5 = 7 \text{ mg/24 hours} = 0.3 \text{ mg IV continuous infusion}$

**References:**

1. Gammaitoni AR, Fine P, Alvarez N, McPherson ML. Clinical application of opioid equianalgesic data. Clin J Pain. 2003; 19:286-297.
2. Pereira J et al. Equianalgesic dose ratios for opioids: a critical review and proposals for long-term dosing. J Pain Sym Manage. 2001; 22:672-687.
3. Anderson R et al. Accuracy in equianalgesic dosing: conversion dilemmas. J Pain Sym Manage. 2001; 21:397-406.
4. Reddy A, Vidal M, Stephen S, et al. The conversion ratio from intravenous hydromorphone to oral opioids in cancer patients. J Pain Symptom Manage 2017; 54(3):280-288.
5. McPherson ML. Demystifying opioid conversion calculations: a guide for effective dosing. 2nd ed. Bethesda:ASHP; ©2018.

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