

FAST FACTS AND CONCEPTS #36 CALCULATING OPIOID DOSE CONVERSIONS

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Introduction A variety of published conversion tables 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; #75 and #86 about methadone; and #181 about oxycodone.

Caution: Published values in equianalgesic tables should be considered a rough clinical guide when making dose conversions; substantial inter-individual variation exists. The final prescribed dose needs to take into account a patient's age, renal, pulmonary and hepatic function; their current pain level and opioid side effects such as sedation; as well as prior and current opioid use.

Opioid Equianalgesic Conversion Ratios for use with the following examples:

Morphine 10 mg parenteral = Morphine 30 mg oral = Hydromorphone 1.5 mg parenteral =
Hydromorphone 7.5 mg oral = Hydrocodone 30 mg oral = Oxycodone 20-30 mg oral (see Reference 1).

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: $90\text{mg q } 12 = 180 \text{ mg Morphine/24 hours}$
2. Use the oral to parenteral equianalgesic ratio: $30 \text{ mg PO Morphine} = 10 \text{ mg IV Morphine}$
3. Calculate new dose using ratios: $180/30 \times 10 = 60 \text{ mg IV Morphine/24 hours}$ or 2.5 mg/hour infusion
4. Some experts recommend starting the new opioid at 75% of the calculated dose to account for inter-individual variation in first pass clearance.

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

There is *incomplete cross-tolerance* between different opioids, but the exact amount will differ. Thus, equianalgesic tables are only approximations. Depending on age and prior side effects, *most experts recommend starting a new opioid at 50% of the calculated equianalgesic dose*, in the setting of well-controlled pain.

Example: Change 90 mg q 12 Extended Release Morphine to oral Hydromorphone.

1. Calculate the 24 hour current dose: $90 \text{ Q12} \times 2 = 180 \text{ mg PO Morphine/24 hrs}$
2. Use the equianalgesic ratio: $30 \text{ mg PO Morphine} = 7.5 \text{ mg PO Hydromorphone}$
3. Calculate new dose using ratios: $180/30 \times 7.5 = 45 \text{ mg oral Hydromorphone/24 hours}$.
4. Reduce dose 50% for cross-tolerance: $45 \times 0.5 = 22 \text{ mg/24 hours} = 4 \text{ mg q4h}$

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

Example: 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: $30 \text{ mg po Morphine} = 10 \text{ mg IV Morphine}$
3. Calculate new dose using ratios: $180/30 \times 10 = 60 \text{ mg IV Morphine/24 hours}$
4. Use the equianalgesic ratio of IV Morphine to IV Hydromorphone: $10 \text{ mg Morphine} = 1.5 \text{ mg Hydromorphone}$
5. Calculate new dose using ratios: $60/10 \times 1.5 = 9 \text{ mg IV Hydromorphone/24 hours}$
6. Reduce dose 50% for cross-tolerance: $9 \times 0.5 = 4.5 \text{ mg/24 hours} = 0.2 \text{ mg IV continuous infusion}$

7. Note: one would also get the same amount of hydromorphone if you directly converted from oral morphine to IV hydromorphone using the 30 mg :1.5 mg ratio

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.

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