



Eastern Metropolitan Region
Palliative Care Consortium

**Eastern Metropolitan Palliative Care Consortium (Victoria)
Clinical Working Party**

Opioid Conversion Ratios - Guide to Practice

October 2008

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INSTRUCTIONS FOR USE

These guidelines work best if used electronically. The Contents pages have hyperlinks to each section.
Printing: It is highly recommended these guidelines are printed in colour, to aid ease of use.

DISCLAIMER

The information contained in this document is to be used as a guideline only. It is the responsibility of the user to ensure information contained in this document is used correctly. These guidelines reflect current Australian/Victorian palliative care practice, and available literature.

All medication doses derived from these guidelines should be checked and prescribed by a medical doctor with appropriate experience before administering. Medication doses should be modified in response to the patient/client's clinical situation and status, including previous exposure to opioids and concurrent medications. When administering opioids, follow your organisation's policy and procedures regarding opioid medications.

All patients should be monitored closely until stable when commencing and/or switching opioid medications.

NOTES

1. Where there are differences in the literature regarding opioid conversion ratios, Australian/Victorian references and clinical practice have been used.
2. Pethidine has not been included in this document, as its use for chronic cancer pain is not recommended. (Therapeutic Guidelines (2005) Palliative Care. Version 2)
3. **Allowing for Incomplete Cross-Tolerance** - When switching from one opioid to another, the new opioid may have increased potency, even if from a similar class of analgesic. Dosage of the new opioid therefore should be based upon several factors, including available equi-analgesic dose data, clinical condition of the patient, concurrent medications and patient safety. It is recommended that the new opioid dose should be reduced by 30% - 50% to allow for incomplete cross-tolerance. The patient should be monitored and assessed closely when a change is made from one opioid medication to another (Pereira, J. et al, 2001, Davis, M.P., 2007).
4. When changing from one opioid to another (when not morphine), always convert to morphine first. For example if converting from transdermal fentanyl to transdermal buprenorphine, first convert transdermal fentanyl to morphine, then convert morphine to transdermal buprenorphine.
5. Parenteral morphine to subcutaneous fentanyl infusion – use ratio 70:1 (McCulloch House website, <http://www.southernhealth.org.au/mcculloch/> accessed February 2008)
6. Buprenorphine to oral morphine ratio is 100:1. This calculation is from the Palliative Care Formulary 3 (Twycross et al, 2007). Australian sources do not give a direct conversion from Buprenorphine to oral morphine; so British information has been used in this case.
7. Buprenorphine: is a partial opioid receptor agonist, so withdrawal symptoms may be experienced in patients who have developed physical dependence on opioids. In overdose it is only partially reversed by naloxone. (www.npsradar.org.au/site.php?page=1&content=/npsradar/content/buprenorphine.html, www.Palliativedrugs.com)
8. The authors have calculated the ratio for converting *transdermal* fentanyl to oral morphine is approximately 150:1, using Therapeutic Guidelines Palliative Care (2005) Dose Conversion of Transdermal Fentanyl Patches to Morphine, Table 10.9 (<http://proxy9.use.hcn.com.au/>). This concurs with Victorian clinical practice and experience.
9. The authors recommend reading Patanwala's (2007) article 'Opioid Conversions in Acute Care' published in the Annals of Pharmacotherapy (Reference 18). This article has recently reviewed literature regarding opioid conversions with the aim of establishing an evidence-based conversion table for converting opioids in the acute care setting.

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ABBREVIATIONS

CSCI = Continuous Subcutaneous Infusion

SC = Subcutaneous

IV = Intravenous

IT = Intrathecal

TD = Transdermal

ORAL MORPHINE TO OTHER ORAL ANALGESICS

Oral to Oral	Conversion Ratio	Example
Morphine to Tramadol	1:5	Oral Morphine 10 mg = Oral Tramadol 50 mg
Morphine to Codeine	1:8	Oral Morphine 7.5 mg = Codeine 60 mg
Morphine to Methadone	-	CONSULTANT REQUIRED. See methadone conversion page for more information. Page: 15
Morphine to Oxycodone	1.5:1	Oral Morphine 15 mg = Oral Oxycodone 10 mg
Morphine to Hydromorphone	5:1	Oral Morphine 5 mg = Oral Hydromorphone 1 mg

PARENTERAL (SC, IV, IM) MORPHINE TO OTHER PARENTERAL (SC, IV, IM) ANALGESICS

From SC, IV, IM	To SC, IV, IM	Ratio	Example	Working example
Morphine	Fentanyl	70:1 ^{Note 5}	Morphine 7 000 micrograms = Fentanyl 100 micrograms	Morphine 70 mg = Fentanyl 1 mg (1000 micrograms)
Morphine	Hydromorphone	5:1	Morphine 10 mg = Hydromorphone 2 mg	
Morphine	Sufentanil	700:1	Morphine 7 000 micrograms = Sufentanil 10 micrograms	Morphine 280 mg/24 CSCI = Sufentanil 400 micrograms/24 CSCI
Morphine	Tramadol	1:10	Morphine 10 mg = Tramadol 100 mg	Morphine 30 mg = Tramadol 300 mg
Morphine	Oxycodone	1.5:1	Morphine 15 mg = Oxycodone 10 mg	Morphine 20 mg = Oxycodone 10mg

MORPHINE TO MORPHINE (different routes)

From	To	Conversion Ratio	Example	Working example
Oral Morphine	Parenteral (S.C./I.V./I.M.)	2-3:1	Oral Morphine 30 mg = 10 mg Parenteral Morphine	Oral Morphine 120 mg = Subcutaneous Morphine 40 mg
Parenteral Morphine	Epidural Morphine	10:1	Parenteral Morphine 10 mg = 1mg Epidural Morphine	Subcutaneous Morphine 100 mg/24 hours = 10 mg/24 hours Epidural Morphine
Parenteral Morphine	Intrathecal Morphine	100:1	Parenteral Morphine 100 mg = 1 mg Intrathecal Morphine	Subcutaneous Morphine 100 mg/24 hours = 1 mg Intrathecal Morphine
Parenteral Morphine	Intraventricular Morphine	1000:1	Parenteral Morphine 100 mg = 0.1 mg (<i>100 micrograms</i>) Intraventricular Morphine	Subcutaneous Morphine 100 mg/24 hours = 0.1 mg Intraventricular Morphine/24 hours

ORAL OPIOIDS TO PARENTERAL OPIOIDS (SC, IV, IM) – Same drug to same drug

Oral	Parenteral	Ratio	Example	Working example
Hydromorphone	Hydromorphone	4:1	Oral Hydromorphone 20 mg = Subcutaneous Hydromorphone 5 mg	Oral Hydromorphone 80 mg = Subcutaneous Hydromorphone 20 mg
Morphine	Morphine	3:1	Oral Morphine 3 mg = Subcutaneous Morphine 1 mg	Oral Morphine 30 mg = Subcutaneous Morphine 10 mg
Methadone	Methadone	2:1	Oral Methadone 2 mg = Subcutaneous Methadone 1 mg	Oral Methadone 20 mg = Subcutaneous Methadone 10 mg
Tramadol	Tramadol	1-1.5:1	Oral Tramadol 25 mg = Intravenous Tramadol 16 mg	Oral Tramadol 150 mg = Parenteral Tramadol 100 mg
Oxycodone	Oxycodone	2:1	Oral Oxycodone 10 mg = Subcutaneous Oxycodone 5 mg	Oral Oxycodone 20 mg = Subcutaneous Oxycodone 10 mg

FENTANYL AND SUFENTANIL CONVERSIONS

From	To	Ratio	Example
Parenteral Fentanyl	Sublingual Fentanyl	1:1	Subcutaneous Fentanyl 100 micrograms = Sublingual Fentanyl 100 micrograms
Parenteral Fentanyl	Transdermal Fentanyl	1:1	Fentanyl 600 micrograms/24 hours = Fentanyl (Durogesic) patch 25 micrograms/hour
Parenteral Fentanyl	Parenteral Sufentanil	10-20:1	Subcutaneous Fentanyl 200 micrograms = Subcutaneous Sufentanil 10 – 20 micrograms
Parenteral Sufentanil	Sublingual Sufentanil	1:1	Subcutaneous Sufentanil 10 micrograms = Sublingual Sufentanil 10 micrograms

TRANSMUCOSAL FENTANYL LOZENGES

Transmucosal fentanyl lozenges for breakthrough pain offer a faster onset of relief than for oral or subcutaneous morphine. At present there is no direct conversion ratio between morphine and transmucosal fentanyl. Manufacturer notes, National Prescribing Service website, and MIMS suggest using a titration method to arrive at the optimum dose, commencing with 200 micrograms (National Prescribing Service website, accessed May 21st, 2008, Orphan Australia Pty Ltd website - Actiq product information, accessed May 21st, 2008).

However, Mercadante et al (2007) suggest that to avoid the difficulty associated with the titration process (prolonged pain, length of time to arrive at adequate dose, patient compliance), that it is possible to calculate a breakthrough dose as a proportion of the overall basal daily dose of opioid the patient is receiving. They state that a breakthrough dose of transmucosal fentanyl should be calculated at 20% of the patient's overall basal daily opioid dose. The breakthrough dose *should not* exceed 20% of the overall basal daily opioid dose (Mercadante, et al, 2007, p. 1832).

A patient should be receiving at least 60mg of oral morphine equivalents, or 25 micrograms transdermal fentanyl per hour, if transmucosal fentanyl is to be considered for breakthrough pain (Mercadante et al, 2007).

For further information we suggest reading the entire paper by Mercadante et al: Mercadante, S., Villari, P, Ferrera, P., Casuccio, A., Mangione, S & Intravaia, G: Transmucosal fentanyl vs intravenous morphine in doses proportional to basal opioid regimen for episodic-breakthrough pain. *British Journal of Cancer* (2007) 96, 1828 – 1833.

Transmucosal fentanyl should only be used in patients who are already receiving opioids, and are opioid tolerant (National Prescribing Service website, accessed May 21st, 2008, Orphan Australia Pty Ltd website - Actiq product information, accessed May 21st, 2008)

TRANSDERMAL FENTANYL TO MORPHINE

Note 8

Patch Strength	Dose	Parenteral Morphine equivalent (mg/24 hours)	Oral Morphine equivalent (mg/24 hours)	Working Example
Fentanyl Patch 12 microgram/hour	288 mcg/24 hours	15 to 20	30 to 50	15 mg MS Contin® b.d. 5 mg immediate release oral morphine 4 hourly
Fentanyl Patch 25 microgram/hour	600 mcg/24 hours	30 to 40	60 to 100	30 mg MS Contin® b.d. 10 mg immediate release oral morphine 4 hourly
Fentanyl Patch 50 microgram/hour	1200 mcg/24 hours	60 to 80	120 to 200	60 mg MS Contin® b.d. 20 mg immediate release oral morphine 4 hourly
Fentanyl Patch 75 microgram/hour	1800 mcg/24 hours	90 to 120	180 to 300	90 mg MS Contin® b.d. 30 mg immediate release oral morphine 4 hourly
Fentanyl Patch 100 microgram/hour	2400 mcg/24 hours	120 to 160	240 to 400	120 mg MS Contin® b.d. 40 mg immediate release oral morphine 4 hourly

Taken from Australian Therapeutic Guidelines (Palliative Care) 2005 – <http://proxy9.use.hcn.com.au/>

CONVERSION CALCULATION – TRANSDERMAL FENTANYL TO ORAL MORPHINE ^{Note 8}

Transdermal fentanyl to oral morphine conversion rate = 150:1

Using 25 micrograms/hour Fentanyl as example:

$$25 \text{ mcg/hour} \times 24 = 600 \text{ mcg/24 hours}$$

$$600 \times 150 = 90\,000 \text{ micrograms morphine} = 90 \text{ mg oral morphine}$$

When ceasing transdermal fentanyl, there will be a therapeutic benefit for a period of time. To ensure pain relief is maintained, carefully consider the timing of the next dose of analgesic. Consider the release times of medications also. For example, oxycontin® has an immediate release component as well as a slow-release component, whereas MS Contin® only has a slow release component, therefore will take longer to reach therapeutic blood levels.

TRANSDERMAL BUPRENORPHINE to ORAL MORPHINE^{NOTE 6, 7}

Patch Strength	Delivery Rate	Conversion Ratio	Oral Morphine Dose	Parenteral morphine dose
Buprenorphine 5 mg/7 days 120 micrograms/24 hours	5 micrograms/hour	100:1	12 mg/24 hours	4 – 6 mg/24 hours
Buprenorphine 10 mg/7 days 240 micrograms/24 hours	10 micrograms/hour	100:1	24 mg/24 hours	8 – 12 mg/24 hours
Buprenorphine 20 mg/7 days 480 micrograms/24 hours	20 micrograms/hour	100:1	48 mg/24 hours	16 – 24 mg/24 hours

CONVERSION CALCULATION – TRANSDERMAL BUPRENORPHINE TO ORAL MORPHINE

5 mg patch = 5 micrograms buprenorphine per hour

5 mcg x 24 = 120 micrograms over 24 hours

120 x 100 = 12 000 ÷ 1000 = 12 mg oral morphine over 24 hours

CONVERSION CALCULATION – ORAL MORPHINE TO TRANSDERMAL BUPRENORPHINE

30 mg morphine over 24 hours:

30 ÷ 100 = 0.3 mg buprenorphine

0.3 x 1000 = 300 micrograms buprenorphine over 24 hours = 12.5 micrograms/hour

Round to 10 mg buprenorphine patch

METHADONE

Conversion to methadone from other opioids is complex, and should not be attempted without consultation with a pain management specialist experienced in the use of methadone. Consultation with a pain management specialist is of particular importance for higher doses shaded in red below. It is *strongly* recommended that Methadone therapy be initiated in the inpatient setting where patients can be closely monitored for signs of cumulative toxicity (commonly sedation or confusion).

Methadone is 1 to 2 times as potent as morphine in single-dose studies, but in individuals on long-term morphine, methadone is closer to 10 times as potent as morphine. According to Patanwala et al (2007) a fixed ratio between methadone and morphine does not exist – they cite several studies to support this (p. 264).

Methadone is lipophilic - care must be taken to avoid toxicity as it may take several days to reach steady-state plasma concentrations. Elimination half-life is lengthy and **highly variable** between individuals.

Conversion methods used by palliative care physicians **vary considerably** and there is no clear-cut evidence to support one method over another. There is no 'Gold Standard' protocol. **Conversions should be based on current daily oral morphine equivalent dosage.**

The Royal Perth Protocol, outlined below, is one of several conversion methods in use locally and internationally.

Royal Perth Methadone Conversion Protocol (Ayonrinde & Bridge, 2000)

METHADONE CONVERSION RATIO		
Daily oral morphine equivalent dose	Conversion Ratio	Methadone dose
Less than 100 mg	3:1	I.e. 3 mg morphine: 1 mg methadone 0 to 30 mg methadone
101 mg to 300 mg	5:1	20 mg to 60 mg methadone
301 mg to 600 mg	10:1	30 mg to 60 mg methadone
601 mg to 800 mg	12:1	50 mg to 65 mg methadone
801 mg to 1000 mg	15:1	50 mg to 65 mg methadone
More than 1000 mg	20:1	50 mg methadone

Conversion from Oral Methadone to parenteral Methadone = Ratio 2:1
E.g. Oral Methadone 20 mg = Parenteral Methadone 10 mg

METHADONE (Continued)

Method:

1. Stop original opioid when commencing methadone.
2. Days 1 and 2 - give calculated daily dose plus 25-50% extra (as loading, to saturate tissues), give in 4 divided doses (6 hourly). Omit loading dose in frail, elderly or in those on long-acting sedatives.
3. Days 3 and 4 – give calculated daily dose (without the loading) in 3 divided doses (8 hourly).
4. Day 5 onwards – give calculated daily dose in 2 divided doses (12 hourly).
5. Use short-acting opioids for breakthrough pain (e.g. oxycodone, morphine).

Example:

Patient taking slow-release morphine 300mg bd = 600mg/day
Predicted daily maintenance dose of methadone = 60mg/day (10:1)

*Day 1 and 2 – give 60 mg + loading dose (e.g. 20 mg) = 80 mg/day, give as 20 mg q.i.d.

*Day 3 and 4 – give 60 mg (i.e. calculated maintenance dose less loading dose), give as 20 mg t.d.s.

*Day 5 onwards – give as 30 mg b.d.

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Eastern Metropolitan Palliative Care Consortium – Palliative Care organization websites:

St. Vincents Health: <http://www.svhm.org.au/>

Eastern Health: <http://www.easternhealth.org.au/>

Eastern Palliative Care <http://www.eastpallcare.asn.au/index.html>

The EMR PCC Working Party hopes you find the document to be a useful guide and a practical resource to your practice. We do welcome feedback regarding recommendations for the planned formal review process in June 2010. Please send your comments to:

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