Appendix 2: Opioid dose conversion ratios

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General approach

It is crucial to appreciate that conversion ratios are *never* more than an approximate guide. Thus, careful monitoring during conversion is necessary to avoid both underdosing and excessive dosing. Also see **Opioid switching ('rotation')**.

This chapter provides a summary of selected opioid dose conversion ratios. These can be used to calculate equivalent doses of opioids when switching from a weak opioid to **morphine**, or from one strong opioid to another. *Caution is always necessary*. Conversion ratios are *never* more than an approximate guide because of:

- wide interindividual variation in opioid pharmacokinetics; influencing factors include age, ethnicity, renal or hepatic impairment
- other variables including dose and duration of opioid treatment, direction of switch in opioid, nutritional status and concurrent medications
- their method of derivation, e.g.:
  - single dose rather than chronic dose studies using a range of clinical doses
  - use of an intermediate step, e.g. PO **morphine** to SC/IV **oxycodone** via either PO **oxycodone** or SC **morphine**.

Careful monitoring is particularly necessary when:

- switching at high doses
- there has been a recent rapid escalation of the first opioid
- conversion ratios have been derived using an intermediate step (see above)
- switching to **methadone**.

Explicit guidance on switching opioids is difficult because both the reasons for switching and the patient's circumstances differ. One guideline, based on expert consensus, recommends routinely reducing the calculated equivalent dose of the new opioid by 25–50% (see **Opioid switching ('rotation')**). Various patient factors are then taken into account to modify the rule, e.g. no reduction in a young patient in severe pain switching at low dose, or an even bigger reduction in an older delirious patient in moderate pain switching at high dose.

Certainly, a dose reduction of at least 50% would seem prudent when switching:

- at high doses (e.g. **morphine** or equivalent doses of ≥1g/24h)
- in elderly or frail patients
- because of intolerable undesirable effects (e.g. delirium)

- when there has been a recent rapid escalation of the first opioid (possibly due to **opioid-induced hyperalgesia**).

In such circumstances, p.r.n. doses can be relied on to make up any deficit while re-titrating to a satisfactory dose of the new opioid.

A separate strategy is necessary for **methadone**.

Determining the dose of the second opioid

> The conversion ratios in this chapter are based on referenced sources given in the various individual opioid monographs and are consistent with a systematic review (for those ratios reviewed).[1] Where these differ significantly from the manufacturers' recommended ratios, the latter are included in italics for comparison, and examples given to illustrate the difference between the predicted doses. Having such a difference can lead to confusion, e.g. see **oxycodone**. Whichever ratio is used, follow local guidance to ensure consistent practice.

Select the appropriate Table based on the routes of administration:

Route	*Table*
PO to PO	**See table 1**
PO to TD	**See table 2**
PO to SC/IV	**See table 3**
SC/IV to SC/IV	**See table 4**

The tables relate mainly to switching to or from **morphine**. If switching from an opioid other than **morphine** to another opioid, it will be necessary to convert the dose of the first opioid to **morphine** equivalents, and then use that quantity to determine the dose of the second opioid. With any switch:

- consider if a reduction of the predicted dose is necessary (see above)
- round the dose up or down to the nearest convenient dose of the formulation concerned, e.g. tablet, TD patch, ampoule
- decide on an appropriate p.r.n. dose.

Table 1 PO to PO opioid dose conversion ratios. *It is essential to read the **General approach** before use*. Ratios reflect published studies. Where these differ from manufacturers' recommendations, the latter are included in italics to illustrate the difference between predicted doses. Whichever ratio is used, follow local guidance to ensure consistent practice.

Conversion	*Ratio*	*Calculation*	*Example*	*Monograph*
Codeine to morphine	10:1 [a]	Divide 24h codeine dose by 10	Codeine 240mg/24h PO → morphine 24mg/24h PO	**Codeine**

Conversion	*Ratio*	*Calculation*	*Example*	*Monograph*
Dihydrocodeine to morphine	10:1 [a]	Divide 24h dihydrocodeine dose by 10	Dihydrocodeine 240mg/24h PO → morphine 24mg/24h PO	**Dihydrocodeine**
Hydrocodone to morphine	1.5:1 [a]	Divide 24h hydrocodone dose by 1.5 (i.e. decrease dose by 1/3)	Hydrocodone 60mg/24h PO → morphine 40mg/24h PO	Not UK
Tramadol to morphine	10:1 [a]	Divide 24h tramadol dose by 10	Tramadol 400mg/24h PO → morphine 40mg/24h PO	**Tramadol**
Morphine to hydromorphone	5:1	Divide 24h morphine dose by 5	Morphine 60mg/24h PO → hydromorphone 12mg/24h PO	**Hydromorphone**
	7.5:1 [b]	*Divide 24h morphine dose by 7.5*	*Morphine 60mg/24h PO → hydromorphone 8mg/24h PO*	**Hydromorphone**
Morphine to methadone	Variable	See **methadone**		
Morphine to oxycodone	1.5:1	Divide 24h morphine dose by 1.5 (i.e. decrease dose by 1/3)	Morphine 60mg/24h PO → oxycodone 40mg/24h PO	**Oxycodone**
	2:1 [b]	*Divide 24h morphine dose by 2*	*Morphine 60mg/24h PO → oxycodone 30mg/24h PO*	**Oxycodone**

a. if converting from a strong to a weak opioid do not exceed the maximum daily recommended dose of the weak opioid

b. italicized entries = manufacturer's recommendation.

Table 2 PO to TD opioid dose conversion ratios. *It is essential to read the **General approach** before use*. Ratios reflect published studies. Where these differ from manufacturers' recommendations, the latter are included in italics. Whichever ratio is used, follow local guidance to ensure consistent practice.

Conversion	*Ratio*	*Calculation*	*Example*	*Monograph*

a. italicized entries = manufacturer's recommendation

a. recommended ratio varies according to the duration of use of the previous strong opioid, see Box B.

Conversion	*Ratio*	*Calculation*	*Example*	*Monograph*
Morphine to buprenorphine	100:1	Multiply 24h morphine dose in mg by 10 to obtain 24h buprenorphine dose in microgram; divide answer by 24 to obtain microgram/h patch strength	Morphine 300mg/24h PO → buprenorphine 3,000microgram/24h → 125microgram/h; *round up* to 70microgram/h × 2 or *round down* to 70+35microgram/h patches	**Buprenorphine**
	75–115:1[a]	*Use the manufacturer's guidelines in SPC, summarized in Box A below*		**Buprenorphine**
Morphine to fentanyl	100:1	Multiply 24h morphine dose in mg by 10 to obtain 24h fentanyl dose in microgram; divide answer by 24 to obtain microgram/h patch strength	Morphine 300mg/24h PO → fentanyl 3,000microgram/24h → 125microgram/h; give as 100+25microgram/h patches	**Fentanyl**
	100:1 or 150:1[a, b]	*Use the manufacturer's guidelines in SPC, summarized in Box B below*	*For 150:1, the fentanyl dose will be smaller than that obtained with 100:1*	**Fentanyl**

italicized entries = manufacturer's recommendation

recommended ratio varies according to the duration of use of the previous strong opioid, see Box B.

For determining the appropriate p.r.n. morphine dose for patients receiving TD buprenorphine or TD fentanyl, see **QCG: Use of transdermal buprenorphine patches** and **QCG: Use of transdermal fentanyl patches**respectively.

Box A Summary of manufacturers' recommendations for starting TD buprenorphine (for full details, see specific SPC) [a]

BuTrans® 5, 10, 15 and 20microgram/h TD buprenorphine patch

Patients aged 18 years and over

The lowest BuTrans® dose (BuTrans® 5microgram/h TD patch) should be used as the initial dose. Consideration should be given to the previous opioid history of the patient as well as to the current general condition and medical status of the patient.

Conversion from opioids

BuTrans ® can be used as an alternative to treatment with other opioids. Such patients should be started on the lowest available dose (BuTrans ® 5microgram/h TD patch) and continue taking short-acting supplemental analgesics during titration, as required.

Transtec ® 35, 52.5 and 70microgram/h TD buprenorphine patch

Patients over 18 years of age

The dose should be adapted to the condition of the individual patient (pain intensity, suffering, individual reaction). The lowest possible dose providing adequate pain relief should be given.

Conversion from opioids

Patients on a Step II (weak opioid) analgesic should begin with buprenorphine 35microgram/h TD. The administration of a non-opioid analgesic can be continued, depending on the patient's overall medical condition.

When switching from a Step III (strong opioid) analgesic to buprenorphine TD, the nature of the previous medication, administration and the mean daily dose should be taken into account in order to avoid the recurrence of pain. It is generally advisable to titrate the dose individually, starting with the lowest TD patch strength (35microgram/h). Clinical experience has shown that patients who were previously treated with higher doses of a strong opioid (approximately 120mg oral morphine per day) may start therapy with the next higher TD patch strength (i.e. 52.5microgram/h).

Sufficient supplementary immediate release analgesics should be made available during dose titration.

The necessary strength of buprenorphine TD must be adapted to the requirements of the individual patient and checked at regular intervals.

After application of the first buprenorphine TD patch the buprenorphine serum concentrations rise slowly and there is unlikely to be a rapid onset of effect. Consequently, a first evaluation of the analgesic effect should only be made after 24h.

The previous analgesic medication (with the exception of transdermal opioids) should be given in the same dose during the first 12h after switching to TD and appropriate rescue medication given on demand in the following 12h.

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a. several branded generic products are available which follow the same recommendations; see individual SPC.

Box B Summary of manufacturer's recommendations for starting Durogesic DTrans ® (for full details see SPC) [a]

Durogesic DTrans ® 12/25/50/75/100microgram/h TD fentanyl patch

Adults:

Initial dose selection

The initial Durogesic DTrans ® dose should be based on the patient's current opioid use, degree of opioid tolerance and the stability of their clinical status.

In opioid-naïve patients, generally, the TD route is not recommended and patients should be titrated with an immediate-release opioid to a dose equivalent to Durogesic Dtrans ® 12–25microgram/h before switching to Durogesic DTrans ® . When this is not possible, use an initial dose of 12microgram/h.

In opioid-tolerant patients, the initial dose of Durogesic DTrans ® should be based on the previous 24h opioid analgesic requirement, expressed as the oral 24h morphine equivalent. The dose of Durogesic DTrans ® is then derived from Tables 1 and 2 according to the patient's clinical status:

Table 1 Adults who have a need for opioid rotation (e.g. because of undesirable effects) or who are less clinically stable (conversion ratio of morphine PO to fentanyl TD of about 150:1)

Oral 24h morphine (mg/24h)	Durogesic DTrans ® (microgram/h)
<90	12
90–134	25
135–224	50
225–314	75
315–404	100
405–494	125
495–584	150
585–674	175
675–764	200
765–854	225
855–944	250
945–1034	275
1035–1124	300

Table 2 Adults on a stable and well-tolerated opioid regimen (conversion ratio of morphine PO to fentanyl TD of about 100:1)

Oral 24h morphine (mg/24h)	Durogesic DTrans ® (microgram/h)
≤44	12
45–89	25
90–149	50
150–209	75
210–269	100
270–329	125
330–389	150
390–449	175
450–509	200

Oral 24h morphine (mg/24h)	Durogesic DTrans ® (microgram/h)
510–569	225
570–629	250
630–689	275
690–749	300

Previous analgesic therapy should be phased out gradually from the time of the first patch application until analgesic efficacy with Durogesic DTrans ® is attained. The initial evaluation of the analgesic effect of Durogesic DTrans ® should not be made until the patch has been worn for 24h due to the gradual increase in serum fentanyl concentrations up to this time.

a. several branded generic products are available which follow the same recommendations; see individual SPC.

Table 3 PO to SC/IV opioid dose conversion ratios. *It is essential to read the **General approach** before use*. Ratios reflect published studies. Where these differ from manufacturers' recommendations, the latter are included in italics to illustrate the difference between predicted doses. Whichever ratio is used, follow local guidance to ensure consistent practice.

Conversion	*Ratio*	*Calculation*	*Example*	*Monograph*
Hydromorphone to hydromorphone	2:1 [a]	Divide 24h hydromorphone dose by 2	Hydromorphone 32mg/24h PO → hydromorphone 16mg/24h SC/IV	**Hydromorphone**
	3:1 [b]	*Divide 24h hydromorphone dose by 3*	*Hydromorphone 32mg/24h PO → hydromorphone 10mg/24h SC/IV*	**Hydromorphone**
Methadone to methadone	2:1 [c]	Divide 24h methadone dose by 2	Methadone 30mg/24h PO → methadone 15mg/24h SC/IV	**Methadone**
Morphine to alfentanil	30:1	Divide 24h morphine dose by 30	Morphine 60mg/24h PO → alfentanil 2mg/24h SC/IV	**Alfentanil**
Morphine to diamorphine	3:1	Divide 24h morphine dose by 3	Morphine 60mg/24h PO → diamorphine 20mg/24h SC/IV	**Diamorphine**
Morphine to fentanyl	Variable [d],[e]	Divide 24h morphine dose in mg by 100–150	Morphine 60mg/24h PO → fentanyl 400microgram/24h SC/IV	**Fentanyl**

Morphine to hydromorphone	10:1	Divide 24h morphine dose by 10	Morphine 60mg/24h PO → hydromorphone 6mg/24h SC/IV	**Hydromorphone**
Morphine to methadone	Variable	See **methadone**		
Morphine to morphine	2:1	Divide 24h morphine dose by 2	Morphine 60mg/24h PO → morphine 30mg/24h SC/IV	**Morphine**
Morphine to oxycodone	2:1 [f]	Divide 24h morphine dose by 2	Morphine 60mg/24h PO → oxycodone 30mg/24h SC/IV	**Oxycodone**
Oxycodone to oxycodone	1.5:1 [g]	Divide 24h oxycodone dose by 1.5 (i.e. decrease dose by 1/3)	Oxycodone 30mg/24h PO → oxycodone 20mg/24h SC/IV	**Oxycodone**
	2:1 [b]	*Divide 24h oxycodone dose by 2*	*Oxycodone 30mg/24h PO → oxycodone 15mg/24h SC/IV*	**Oxycodone**

a. because mean oral bio-availability is 50% (range 35–60%), some centres use a conversion ratio of 2:1 rather than 3:1

b. italicized entry = manufacturer's recommendation

c. because mean oral bio-availability is 80% (range 40–100%), some centres use 1:1, e.g. methadone 30mg/24h PO → methadone 30mg/24h SC/IV, see **methadone**

d. the same conversion ratios as for morphine PO to fentanyl TD can be used for morphine PO to fentanyl SC/IV, see Table 2

e. volume constraints for a syringe driver may prevent doses >500microgram/24h being used; alfentanil is an alternative

f. derived using an intermediate step from the ratios for PO morphine to SC morphine (see above) and SC morphine to SC oxycodone (**Table 4**); for further explanation, see **oxycodone**

g. because mean oral bio-availability is 75% (range 60–87%), some centres use a conversion ratio of 1.5:1 rather than 2:1.

Table 4 SC/IV to SC/IV opioid dose conversion ratios. *It is essential to read the **General approach** before use.*Ratios are based on referenced sources given in the various individual opioid monographs. Follow local guidance to ensure consistent practice.

Conversion	***Ratio***	***Calculation***	***Example***	***Monograph***
Morphine to alfentanil	15:1	Divide 24h morphine dose by 15	Morphine 30mg/24h SC/IV → alfentanil 2mg/24h SC/IV	**Alfentanil**

Conversion	*Ratio*	*Calculation*	*Example*	*Monograph*
Morphine to buprenorphine	30–40:1	Divide 24h morphine dose in mg by 30–40	Morphine 40mg/24h SC/IV → buprenorphine 1mg/24h SC/IV	**Buprenorphine**
Morphine to diamorphine	1.5:1	Divide 24h morphine dose by 1.5 (i.e. decrease dose by 1/3)	Morphine 30mg/24h SC/IV → diamorphine 20mg/24h SC/IV	**Diamorphine**
Morphine to fentanyl	50–75:1 [a, b]	Divide 24h morphine dose in mg by 50–75	Morphine 30mg/24h SC/IV → fentanyl 400microgram/24h SC/IV	**Fentanyl**
Morphine to hydromorphone	5:1	Divide 24h morphine dose by 5	Morphine 30mg/24h SC/IV → hydromorphone 6mg/24h SC/IV	**Hydromorphone**
Morphine to methadone	Variable	See **methadone**		
Morphine to oxycodone [c]	1:1	Use same dose as 24h morphine dose	Morphine 30mg/24h SC/IV → oxycodone 30mg/24h SC/IV	**Oxycodone**

a. extrapolated from the manufacturer's recommended ratios for morphine PO to fentanyl TD, which varies according to the duration of use of the previous strong opioid, see Table 2 and Box B

b. volume constraints for a syringe driver may prevent doses >500microgram/24h being used; alfentanil is an alternative

c. a 1:1 ratio is consistent with referenced sources and the manufacturer's recommendation (see **oxycodone**).

References

1. Davis MP *et al.* (2024) Opioid analgesic dose and route conversion ratio studies: a scoping review to inform an eDelphi guideline. *Supportive Care in Cancer*. **32**: 542.