Opioid Switching using Equivalence Tables

When switching patients to a different opioid agent, equivalence tables are used to estimate an equipotent dose of the target opioid. However, variation among patients in bioavailability of oral opioids, unpredictable or incomplete tolerance between opioids and other patient-specific issues must also be considered[1-4].

A suggested protocol is described below and demonstrated in the following examples.

1. Calculate the total daily dose of the current opioid[5].
2. Use an equivalence table to estimate the equivalent amount of target opioid[5].
3. Decrease the calculated dose by:
   - 50% if the patient is on a high dose of the current opioid
   - 25 to 40% if on a low to moderate dose[6]
4. Further dose adjustments may be necessary depending on individual patient factors:
   - Type of pain – acute or chronic (higher doses may be required for acute pain)[4]
   - Co-morbidities (e.g. liver or renal dysfunction) – check monographs[7]
   - Age (e.g., elderly are more susceptible to adverse effects of opioids – consider starting with a lower dose)[6]
   - Medication profile – dose may need to be adjusted to prevent adverse effects due to drug interaction[7]
5. The initial dose can then titrated as necessary to maintain pain control. An immediate release opioid should also be indicated for incident or breakthrough pain, especially during the titration period. To calculate a single PRN dose, use 10 to 15% of the total daily dose[4].
6. Advise patients/caregivers to:
   - Record the number of rescue doses used and report signs and symptoms of under-treatment of pain.
   - Report signs and symptoms of over sedation (slurring words, mood swings, loss of coordination, falling asleep during conversation or other activities).
7. Follow-up with patients to assess pain control and adverse effects. The “Canadian Guideline for the Safe and Effective Use of Opioids” recommends a three-day tolerance check after initiating a new opioid[7].

EXAMPLE 1: SWITCHING TO LOWER POTENCY OPIOID

Patient with chronic pain currently taking Hydromorph Contin Controlled Release Capsules (hydromorphone CR) 6 mg q12h is being switched to M-Eslon (morphine sulphate ER). What initial dose of M-Eslon should be recommended?

- Calculate 24-hour dose of hydromorphone = 56 x 2 = **12 mg hydromorphone**
- Conversion Method 1:
  - Using Table 1 (see below), convert hydromorphone 24-hour dose to oral morphine equivalent 12 x 5 = **60 mg morphine/24 hrs**
- Conversion Method 2:
  - Using morphine equivalents from Table 1

    $$\frac{\text{6 hydromorphone}}{\text{30 mg morphine}} = \frac{\text{12 mg hydromorphone}}{\text{X}}$$

  - X = 100 x 6/20 = **30 mg hydromorphone/24 hrs**
- Decrease dose by 25 to 40% (currently on relatively low dose of hydromorphone) = **36 to 45 mg morphine/24 hrs**. M-Eslon is available in 10, 15, 30, 60 and 100 mg strengths). **M-Eslon 20 mg (2 x 10 mg) every 12 hrs** would be a reasonable starting dose.
- Provide supply of immediate release (IR) rescue medication for breakthrough pain: 10 to 15% of 24 hours total dose (40 mg morphine sulfate) **= 4 to 6 mg morphine sulphate IR/dose q2h PRN.**
- Follow up with the patient within a minimum of three days. Adjust dose of M-Eslon if necessary based on pain control, amount of rescue medication needed and any adverse effects.
  - For example, if the patient requires an average of five 4 mg rescue doses every 24 hours, increase the dose of M-Eslon to 30 mg every 12 hours.

EXAMPLE 2: SWITCHING TO HIGHER POTENCY OPIOID

A patient with chronic non-cancer pain currently taking Hydromorph Contin (hydromorphone CR) 18 mg q12h is being switched to fentanyl patches.

- Current 24 hour dose of hydromorphone = 18 x 2 = **36 mg hydromorphone**
- Convert to morphine milligram equivalent
  - **Method 1** – Using Table 1 (see below), convert hydromorphone 24-hour dose to oral morphine equivalent 36 x 5 = **180 mg morphine/24 hrs**
  - **Method 2** – Using morphine equivalents from Table 1

    $$\frac{\text{6 mg hydromorphone}}{\text{30 mg morphine}} = \frac{\text{36 mg hydromorphone}}{\text{X}}$$

X = 36 x 30/6 = **180 mg morphine/24 hrs**

- Convert 180 mg morphine equivalent to fentanyl using Table 1 = **50 mcg/hr. (*Note this dose should not be decreased further as it is already conservative.*)**
    - Recommend **one fentanyl 50 mcg patch every 72 hours.**

- Calculate dose needed for PRN immediate release rescue opioid
    - Immediate release (IR) rescue medication = 10 to 15% of 24 hours CR dose (180 mg morphine equivalents) = 0.1 to 0.15 x 180 = **18 to 27 mg morphine equivalents**
    - Using Table 1, 18 to 27 morphine equivalents = 18 to 27 x 0.2 = 3.6 to 5.4 mg hydromorphone. **Hydromorphone 4 mg IR** would be a reasonable dose.

- The dose of fentanyl should not be adjusted for at least 72 hours after application of the initial patch. The dose adjustment, if necessary, should be based on the amount of rescue medication needed on the second and third day after application. Subsequent changes to the patch dose should occur no more than every six days.

EXAMPLE 3: SWITCHING FROM AN OPIOID PATCH TO ORAL OPIOD[8,9]

A patient currently using fentanyl 50 mcg patches is switched to oral hydromorphone.

- Calculate the equivalent 24 hour dose of morphine milligram equivalent (Do NOT use Table 1). Estimates on equivalence vary but a conversion factor of 1mcg fentanyl/hr ~ 2 mg morphine/day is suggested as a conservative starting pint. Using this:
    - 50 mcg fentanyl patch ~ 100 mg morphine /24hrs
    - Use Table 1 to convert morphine to hydromorphone:
      100 mg morphine **= 20 mg hydromorphone/24 hrs**

- Remove fentanyl patch. It will take 17 hours for 50% of the fentanyl to be eliminated from the body. Instruct patient to continue using current rescue medication as needed for pain relief.

- The patient should continue using rescue doses as needed for 48 hours

  OR

  After 12 hours, start regular q 4 h dose of IR opioid at ½ the calculated 24 hour dose:
    - 20 mg per 24 hrs/2 = 10/6 doses per 24 h ~ **2 mg hydromorphone IR q 4 hr plus rescue doses 12 h as needed**

- After 48 hours, switch to controlled release opioid: **hydromorphone CR 9 mg or 12 mg q 12 hours** (depending on prior use of rescue medication) and rescue hydromorphone IR q 2 hours as needed.
    - Monitor for pain control and number of rescue does used and adjust dose of hydromorphone CR as indicated.

Table 1: Oral Opioid Analgesic Equivalence Table

(Adapted from Canadian Guideline for Safe and Effective Use of Opioids[6])

Opioid	Equivalence to oral morphine 30 mg:	To convert to oral morphine equivalent multiply by:	To convert from oral morphine multiply by:
Morphine	30mg	1	1
Codeine *	200 mg	0.15	6.67
Oxycodone	20 mg	1.5	0.667
Hydromorphone	6 mg	5	0.2
Meperidine **	300 mg	0.1	10
Methadone	Morphine dose equivalence not reliably established.		
Tramadol *			
Transdermal fentanyl	60–134 mg morphine = 25mcg/h 180–224 mg = 50 mcg/h 225–269 mg = 62 mcg/h 270–314 mg = 75 mcg/h 315–359 mg = 87 mcg/h 360–404 mg = 100 mcg/h	These estimates are conservative; therefore, DO NOT use these values for reverse conversion (e.g. fentanyl to to morphine)	

* Codeine and tramadol are both prodrugs that are metabolized to active metabolites, and it is possible that someone who lacks the ability to metabolize them or is taking a drug which inhibits their metabolism may essentially be opioid naive. Direct conversion from codeine or tramadol to transdermal fentanyl is not recommended.

** Meperidine is not recommended for chronic pain.

Table 2: Oral – Parenteral Opioid Analgesic Equivalence Table[5,7]

Opioid	Parenteral	Oral
Morphine	10 mg	20 – 30 mg
Hydromorphone	2	4 – 6 mg
Meperidine	75	300 mg
Fentanyl	0.1 mg	-

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