

Table 3. Pharmacology of Opiate Analgesics (1, 128, 440, 472)

Opiates	Equi-Analgesic Dose (mg)		Onset (IV)	Elimination Half-Life	Context-Sensitive Half-Life	Metabolic Pathway	Active Metabolites	Intermittent Dosing	IV Infusion Rates	Side-Effects and Other Information
	IV	PO								
Fentanyl	0.1	N/A	1 - 2 min	2 - 4 hr	200 min (6 h infusion); 300 min (12 h infusion) ^a	N-dealkylation CYP3A4/5 substrate	None	0.35 - 0.5 mcg/kg IV q0.5 - 1 hr	0.7 - 10 mcg/kg/hr	Less hypotension than with morphine. Accumulation with hepatic impairment.
Hydromorphone	1.5	7.5	5 - 15 min	2 - 3 hr	N/A	Glucuronidation	None	0.2 - 0.6 mg IV q1-2 hr ^b	0.5 - 3 mg/hr	Therapeutic option in patients tolerant to morphine/fentanyl. Accumulation with hepatic/renal impairment.
Morphine	10	30	5 - 10 min	3 - 4 hr	N/A	Glucuronidation	6- and 3-glucuronide metabolite	2 - 4 mg IV q 1 - 2 hr ^b	2 - 30 mg/hr	Accumulation with hepatic/renal impairment. Histamine release.
Methadone	N/A ^c	N/A ^c	1 - 3 d	15 - 60 hr	N/A	N-demethylation CYP3A4/5, 2D6, 2B6, 1A2 substrate	N-demethylated derivative	IV/PO: 10 - 40 mg q6-12 hr IV: 2.5 - 10 mg q8 - 12 hr	Not recommended	May be used to slow the development of tolerance where there is an escalation of opioid dosing requirements. Unpredictable pharmacokinetics; unpredictable pharmacodynamics in opiate naïve patients. Monitor QTc ^d .
Remifentanyl	N/A	N/A	1 - 3 min	3 - 10 min	3 - 4 min	Hydrolysis by plasma esterases	None	N/A	Loading dose 1.5 mcg/kg IV then 0.5 - 15 mcg/kg/hr	No accumulation in hepatic/renal failure. Use IBW if body weight >130% IBW.

PO = oral; N/A = not applicable; IBW = ideal body weight.

^aAfter 12 hr, and in cases of end organ dysfunction, the context sensitive half-time increases unpredictably.

^bMay increase dose to extend dosing interval; hydromorphone 0.5 mg IV every 3 hrs, or morphine 4-8 mg IV every 3-4 hrs.

^cEquianalgesic dosing tables may underestimate the potency of methadone. The morphine- or hydromorphone-to-methadone conversion ratio increases (i.e., the potency of methadone increases) as the dose of morphine or hydromorphone increases. The relative analgesic potency ratio of oral to parenteral methadone is 2:1 but the confidence intervals are wide.

^dQTc is the Q-T interval (corrected) of the electrocardiographic tracing.

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