Equianalgesic Dosing Chart

Drug	Equianalgesic Dose (mg)		Onset	Duration	Comments
	Oral	IV			
Morphine IR (Oral, IV, SC, IM)	30	10	20-30 min	3-6 hr	
Morphine CR (MS Contin/Oramorph)			2-4 hr	8-12 hr	
Morphine SR (Avinza/Kadian/Embeda)			1-2 hr	12-24 hr	
Codeine	200	120	30-60 min	3-4 hr	
Hydrocodone IR (Norco)	30		20-30 min	3-4 hr	
Hydrocodone ER (Zohydro ER)			6-10 hr	12 hr	
Hydrocodone ER (Hysingla ER)			8-12 hr	24 hr	
Hydromorphone IR (Dilaudid)	7.5	1.5	30-60 min	4-6 hr	
Hydromorphone ER (Exalgo)				24 hr	
Oxycodone IR (Percocet, Roxicodone)	20		20-30 min	4-6 hr	
Oxycodone MR (Oxycontin)			2-4 hr	8-12 hr	
Oxymorphone IR (Opana)	10	1	30-60 min	4-6 hr	
Oxymorphone MR (Opana ER)			1-3 hr	12 hr	
Meperidine	300	100	30 min	3 hr	
Levorphanol	4 (acute) 1 (chronic)		10-60 min	4-8 hr	
Methadone	20	10	30-60 min	12-190 hr	See Methadone section
Fentanyl (IV)		0.1	1-5 min	0.5-3 hr	See Fentanyl patch section
Remifentanil		0.01	1-5 min		
Sufentanil		0.04	1-5 min		
Tramadol IR (Ultram)	150		60 min	4-6 hr	May dec. seizure threshold; max 300mg/day if >75 and max 200mg/day if renal impaired
Tramadol ER (Ultram ER)	150		60 min	24 hr	
Buprenorphine IV (Buprenex)		0.3	5-15 min	6-8 hr	May precipitate withdrawal of other opioids; don't titrate patch more frequently than 3 days
Buprenorphine SL (Subutex)	0.4		10-30 min	6-8 hr	
Buprenorphine TD (Butrans; max dose 20 mcg/hr)	See Butrans Dosing Chart		17 hr	7 days	
Tapentadol (Nucynta; max dose 500 mg/day)	100mg Tapentadol equal to oxycodone 15 mg		60 min	4-6 hr	mu-opioid agonist/norepinephrine reuptake inhibitor

Intraspinal Equianalgedic Chart

Drug	Oral	Parenteral	Epidural	Intrathecal
Morphine	300 mg	100 mg	10 mg	1 mg
Hydromorphone	60 mg	20 mg	2 mg	0.25 mg
Fentanyl		1 mg	0.01 mg	0.001 mg
Sufentanil		0.1 mg	0.001 mg	

Fentanyl Patch Conversion

Oral Morphine Equivalent Daily Dose (mg/24-hr)	Fentanyl Patch Dose (mcg/hr)
60-134	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

Butrans Patch Conversion

Oral Morphine Equivalent Daily Dose (mg/24-hr)	Starting Butrans Patch dose
< 30 or opioid naïve	5 mcg/hr patch
30-80	10 mcg/hr patch
> 80	Butrans **NOT** appropriate

Morphine to Methadone Conversion

Oral Morphine Equivalent Daily Dose (mg/24-hr)	Initial Ratio (Oral Morphine : Oral Methadone)
< 30	2:1
30-99	4:1
100-299	8:1
300-499	12:1
500-999	15:1
>1000	20:1

Children and Adults <50 kg body weight STARTING DOSES

Drug	Oral Starting Dose	Parenteral Starting Dose
Codeine	0.5-1 mg/kg q 3-4 hr PRN	Not Recommended
Hydrocodone w/ APAP	0.2 mg/kg q 3-4 hr PRN	
Hydromorphone	0.06 mg/kg q 3-4 hr PRN	0.015 mg/kg q 3-4 hr PRN
Methadone	0.2 mg/kg q 4-8 hr PRN	0.1 mg/kg q 4-8 hr PRN
Morphine	0.3 mg/kg q 3-4 hr PRN	0.05-0.1 mg/kg q 2-4 hr PRN
Oxycodone	0.1 mg/kg q 3-4 hr PRN	
Fentanyl		0.5-3 mcg/kg/dose q 2-4 hr PRN 0.25-2 mcg/kg/hour continuous infusion

Using Ketamine:
Uses: Refractory pain particularly if neuropathic or refractory to high dose opioids
Oral dosing: 10 mg q 6 hr (must use IV product to compound); increase dose by 10 mg q 6 hr
Adverse effects: dizziness, hallucinations, dream-like feelings

Naloxone Administration:
Uses: sedation or respiratory depression from opiods
Dosing: 0.4 mg in 10 mL saline; give 1 mL ever 2-3 minutes until response
Half-life: 30-60 min so repeat dosing often necessary
Infusion: 2.5 mg/250mL started at 4 mL/hr (0.04mg/hr); titrate by 1 mL/hour every 20 minutes

Co-Analgesics

Pain Source	Pain Character	Examples	Comments
Bone or Soft Tissue	Tenderness over bone or joint. Pain on movement. Inflammatory pain	Ibuprofen 400-800 mg q 4-6 hr PRN	Max dose: 3200 mg/day; available as 100mg/5mL suspension
		Celecoxib 100 mg q 12 hr	COX-2 inhibitor; Fewer GI side effects; Avoid in sulfa allergy
		Ketorolac 10-15 mg q 4-6 hr	Oral, IV, or IM; Maximum of 5 days or 20 doses regardless of route of administration
Anxiety	Generalized restlessness and discomfort	Diazepam 2-10 mg q 6-12 hr	Oral, SL, IV, PR; Half-life=20-80 hr; Can give scheduled q12 hr after acute anxiety resolved
		Lorazepam 0.5-4 mg q 4-6 hr	Oral, SL, IV, SQ, PR; Half-life=10-20 hr; Available as an intensol (2mg/mL)
		Hydroxyzine 10-50 mg q 4-8 hr	Oral, IM; Liquid available
		Haloperidol 0.5-4 mg q 4-8 hr	Oral, SL, IV, SQ, PR; Can give scheduled q 12 hr after acute anxiety resolved
Nerve Pain	"Burning" or "Shooting" pain radiating from plexus or spinal root	Desipramine or Nortriptyline 10-150 mg q HS	May be sedating; Fewer side effects than amitriptyline; start low and titrate every 3-4 days; Analgesic dose typically less than antidepressant dose
		Duloxetine 30-120 mg daily	Use with caution in hepatic impairment
		Carbamazepine 100 mg BID	Max: 1200 mg/day; Side effects include blood dyscrasias, SIADH, and rash
		Topiramate 25-50 mg q 12 hr	Max dose 400 mg/day; Titrate dose to effect
		Gabapentin 100-1200 mg TID	Max dose: 6000 mg/d; Start low and titrate up; low doses usually ineffective
		Pregabalin 50 mg q8-12 hr	Max dose: 600 mg/day; Favorable kinetic profile
		Valproic acid 250-1500 mg q HS or divided doses	Available as immediate release, sustained release, and sprinkle
Smooth Muscle Spasms	Colic-Cramping abdominal pain, bladder spasms	Hyoscyamine 0.125-0.25 mg q 4-8 hr	Oral, SL, IV, SQ; sustained-release available; IV dose: 0.1-0.2 mg q 4 hr
		Glycopyrrolate 1-2 mg q 4 hr	Oral, IV, SQ; IV dose: 0.1-0.2 mg q 6-8 hr
		Scopolamine 1.5 mg patch q 72 hr	DO NOT cut patch
		Dicyclomine 10-20 mg q 8 hr	Oral, IM, 10 mg/mL syrup
		Oxybutynin 5-10 mg q 8 hr	Oral, Liquid, patch; available as sustained release

Management of Opioid Side Effects

Symptom	Recommendation	Comments
Constipation	Docusate 100 mg BID **PLUS** Senna 2 tabs daily	- Tolerance does not develop for this side effect - Initiate whenever starting opioid therapy - Titrate until BM of at least q 2-3 days - Avoid bulk forming laxatives (miralax) if PO fluid intake < 2 L/day
Nausea / Vomiting	Metoclopramide 10 mg four times daily Haloperidol 0.5 mg oral q 4 hr PRN	- Tolerance often develops for N/V after several days of opioid therapy - Metoclopramide is drug of choice as 70% of pt. develop N/V and 50% develop gastric paresis - Use haloperidol in absence of gastric stasis on as needed basis - Prochlorperazine and Promethazine can be given rectally
Sedation	Methylphenidate or Dextro-amphetamine 2.5-5 mg qAM and noon	- Tolerance often develops for sedation after several days of opioid therapy - Continued pain when sedated may indicate need for stimulant or co-analgesic
Pruritis	Doxepin 10 mg daily or twice daily	- Tricyclic antidepressants have an anti-histamine effect in addition to anti-depression - Pruritis most common with morphine
Respiratory Depression	NOT EXPECTED WITH CHRONIC OPIOID THERAPY	- Tolerance to respiratory depression occurs after several days of opioid therapy - Fear of respiratory depression is often overstated and may lead to inadequate analgesia - Data show large doses of opioids adequate to relieve pain do not hasten death

Ten Principles for Using Opioids Effectively

1. Perform comprehensive assessment of types and severity of pain
2. Starting doses based on severity of pain and patient characteristics (age, co-morbidities)
3. 3-step approach: non-opioid for mild pain; low-dose opioid for moderate pain; strong opioid for severe pain
4. Manage and anticipate side effects of opioids
5. Meperidine, codeine, pentazocine, and nalbuphine are **NOT** recommended for chronic pain
6. Schedule based on duration of action; If analgesia wears off increase the dose **NOT** the frequency
7. When converting opioids start with 50-75% of equianalgesic dose to account for cross-tolerance
8. Break-through/rescue opioid should be 10-15% of total 24-hr opioid dose
9. If patient consistently uses >2 rescue doses per day increase their scheduled opioid therapy
10. In non-verbal patients change in behavior is most reliable way to assess pain

Patient Controlled Analgesia (PCA)

Drug	Loading Dose (*Optional*)	Bolus dose	Lockout Interval	Four hour Dose Limit
Morphine	Opioid naïve: 2-4 mg Elderly (>70 yr): 2 mg	Opioid naïve: 1 mg Elderly: 0.5 mg	8-15 min	Opioid naïve: 30 mg Elderly: 10 mg
Hydromorphone	Opioid naïve: 0.2-0.3 mg Elderly (>70 yr): 0.2 mg	Opioid naïve: 0.2 mg Elderly: 0.1 mg	8-15 min	Opioid naïve: 1.5 mg Elderly: 1 mg
Fentanyl	Opioid naïve: 25-75 mcg Elderly: 25 mcg	Opioid naïve: 10-50 mcg Elderly: 10-20 mcg	8-15 min	Opioid naïve: 100 mcg Elderly: 60 mcg

Co-Analgesics

Pain Source	Pain Character	Examples	Comments
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		Lorazepam 0.5-4 mg q 4-6 hr	Oral, SL, IV, SQ, PR; Half-life=10-20 hr; Available as an intensol (2mg/mL)
		Hydroxyzine 10-50 mg q 4-8 hr	Oral, IM; Liquid available
		Haloperidol 0.5-4 mg q 4-8 hr	Oral, SL, IV, SQ, PR; Can give scheduled q 12 hr after acute anxiety resolved
Nerve Pain	"Burning" or "Shooting" pain radiating from plexus or spinal root	Desipramine or Nortriptyline 10-150 mg q HS	May be sedating; Fewer side effects than amitriptyline; start low and titrate every 3-4 days; Analgesic dose typically less than antidepressant dose
		Duloxetine 30-120 mg daily	Use with caution in hepatic impairment
		Carbamazepine 100 mg BID	Max: 1200 mg/day; Side effects include blood dyscrasias, SIADH, and rash
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		Valproic acid 250-1500 mg q HS or divided doses	Available as immediate release, sustained release, and sprinkle
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		Glycopyrrolate 1-2 mg q 4 hr	Oral, IV, SQ; IV dose: 0.1-0.2 mg q 6-8 hr
		Scopolamine 1.5 mg patch q 72 hr	DO NOT cut patch
		Dicyclomine 10-20 mg q 8 hr	Oral, IM, 10 mg/mL syrup
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Sedation	Methylphenidate or Dextro-amphetamine 2.5-5 mg qAM and noon	- Tolerance often develops for sedation after several days of opioid therapy - Continued pain when sedated may indicate need for stimulant or co-analgesic
Pruritis	Doxepin 10 mg daily or twice daily	- Tricyclic antidepressants have an anti-histamine effect in addition to anti-depression - Pruritis most common with morphine
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Morphine	Opioid naïve: 2-4 mg Elderly (>70 yr): 2 mg	Opioid naïve: 1 mg Elderly: 0.5 mg	8-15 min	Opioid naïve: 30 mg Elderly: 10 mg
Hydromorphone	Opioid naïve: 0.2-0.3 mg Elderly (>70 yr): 0.2 mg	Opioid naïve: 0.2 mg Elderly: 0.1 mg	8-15 min	Opioid naïve: 1.5 mg Elderly: 1 mg
Fentanyl	Opioid naïve: 25-75 mcg Elderly: 25 mcg	Opioid naïve: 10-50 mcg Elderly: 10-20 mcg	8-15 min	Opioid naïve: 100 mcg Elderly: 60 mcg

Equianalgesic Dosing Chart

Drug	Equianalgesic Dose (mg)		Onset	Duration	Comments
	Oral	IV			
Morphine IR (Oral, IV, SC, IM)	30	10	20-30 min	3-6 hr	
Morphine CR (MS Contin/Oramorph)			2-4 hr	8-12 hr	
Morphine SR (Avinza/Kadian/Embeda)			1-2 hr	12-24 hr	
Codeine	200	120	30-60 min	3-4 hr	
Hydrocodone IR (Norco)	30		20-30 min	3-4 hr	
Hydrocodone ER (Zohydro ER)			6-10 hr	12 hr	
Hydrocodone ER (Hysingla ER)			8-12 hr	24 hr	
Hydromorphone IR (Dilaudid)	7.5	1.5	30-60 min	4-6 hr	
Hydromorphone ER (Exalgo)				24 hr	
Oxycodone IR (Percocet, Roxicodone)	20		20-30 min	4-6 hr	
Oxycodone MR (Oxycontin)			2-4 hr	8-12 hr	
Oxymorphone IR (Opana)	10	1	30-60 min	4-6 hr	
Oxymorphone MR (Opana ER)			1-3 hr	12 hr	
Meperidine	300	100	30 min	3 hr	
Levorphanol	4 (acute) 1 (chronic)		10-60 min	4-8 hr	
Methadone	20	10	30-60 min	12-190 hr	See Methadone section
Fentanyl (IV)		0.1	1-5 min	0.5-3 hr	See Fentanyl patch section
Remifentanil		0.01	1-5 min		
Sufentanil		0.04	1-5 min		
Tramadol IR (Ultram)	150		60 min	4-6 hr	May dec. seizure threshold; max 300mg/day if >75 and max 200mg/day if renal impaired
Tramadol ER (Ultram ER)	150		60 min	24 hr	
Buprenorphine IV (Buprenex)		0.3	5-15 min	6-8 hr	May precipitate withdrawal of other opioids; don't titrate patch more frequently than 3 days
Buprenorphine SL (Subutex)	0.4		10-30 min	6-8 hr	
Buprenorphine TD (Butrans; max dose 20 mcg/hr)	See Butrans Dosing Chart		17 hr	7 days	
Tapentadol (Nucynta; max dose 500 mg/day)	100mg Tapentadol equal to oxycodone 15 mg		60 min	4-6 hr	mu-opioid agonist/norepinephrine reuptake inhibitor

Intraspinal Equianalgedic Chart

Drug	Oral	Parenteral	Epidural	Intrathecal
Morphine	300 mg	100 mg	10 mg	1 mg
Hydromorphone	60 mg	20 mg	2 mg	0.25 mg
Fentanyl		1 mg	0.01 mg	0.001 mg
Sufentanil		0.1 mg	0.001 mg	

Fentanyl Patch Conversion

Oral Morphine Equivalent Daily Dose (mg/24-hr)	Fentanyl Patch Dose (mcg/hr)
60-134	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

Butrans Patch Conversion

Oral Morphine Equivalent Daily Dose (mg/24-hr)	Starting Butrans Patch dose
< 30 or opioid naïve	5 mcg/hr patch
30-80	10 mcg/hr patch
> 80	Butrans **NOT** appropriate

Morphine to Methadone Conversion

Oral Morphine Equivalent Daily Dose (mg/24-hr)	Initial Ratio (Oral Morphine : Oral Methadone)
< 30	2:1
30-99	4:1
100-299	8:1
300-499	12:1
500-999	15:1
>1000	20:1

Children and Adults <50 kg body weight STARTING DOSES

Drug	Oral Starting Dose	Parenteral Starting Dose
Codeine	0.5-1 mg/kg q 3-4 hr PRN	Not Recommended
Hydrocodone w/ APAP	0.2 mg/kg q 3-4 hr PRN	
Hydromorphone	0.06 mg/kg q 3-4 hr PRN	0.015 mg/kg q 3-4 hr PRN
Methadone	0.2 mg/kg q 4-8 hr PRN	0.1 mg/kg q 4-8 hr PRN
Morphine	0.3 mg/kg q 3-4 hr PRN	0.05-0.1 mg/kg q 2-4 hr PRN
Oxycodone	0.1 mg/kg q 3-4 hr PRN	
Fentanyl		0.5-3 mcg/kg/dose q 2-4 hr PRN 0.25-2 mcg/kg/hour continuous infusion

Using Ketamine:

Uses: Refractory pain particularly if neuropathic or refractory to high dose opioids
Oral dosing: 10 mg q 6 hr (must use IV product to compound); increase dose by 10 mg q 6 hr
Adverse effects: dizziness, hallucinations, dream-like feelings

Naloxone Administration:

Uses: sedation or respiratory depression from opiods
Dosing: 0.4 mg in 10 mL saline; give 1 mL ever 2-3 minutes until response
Half-life: 30-60 min so repeat dosing often necessary
Infusion: 2.5 mg/250mL started at 4 mL/hr (0.04mg/hr); titrate by 1 mL/hour every 20 minutes