Adjuvant Medications

Class Indication*	Starting Dose Range and Frequency	Max. Daily Dose (mg)	Titration Increase (based on response and side effect)
Anticonvulsants Neuropathic pain	Gabapentin 100-300 mg PO HS-QID	3600	100-300 mg q3d
	Clonazepam 0.25-0.5 mg PO HS	6	0.25 mg q5d BID-TID
	Pregabalin 25-50 mg PO HS-TID	600	25-75 mg q3d
	Oxcarbazepine 100 mg PO HS	1200	150 mg q7d BID-TID
	Lamotrigine 25 mg PO daily-BID	400	25 mg q7d
	Topirimate 25 mg PO HS	200	25 mg q7d to 100 mg, then BID
Antidepressants Neuropathic pain	Amitriptyline Desipramine Nortriptyline (10-25 mg PO HS (10 mg elderly))	150 100 150	10-25 mg q7d
	Duloxetine 20-60 mg PO q HS-BID	120	20 mg q7d
	Venlafaxine 75 mg PO BID	225	75 mg q1-7d
	Doxepin 75 mg PO q HS	300	75 mg q3-7d
	Milnacipran 12.5 mg PO daily	200	Titration pack to 50 mg BID
Antispasmodics Muscle spasms	Baclofen 5 mg PO TID-QID	80	15 mg q3d
	Cyclobenzaprine 5 mg PO TID	60	5 mg q3d
	Methocarbamol 1.5 gm PO TID-QID	4500	Limit QID dosing to < 72h
	Dicyclomine 20 mg PO QID	160	
	Tizanidine 2-4 mg PO q HS-QID	36	2-4 mg over 2-4 weeks
	Diazepam 2-10 mg PO/IV daily-TID	40	
Benzodiazepines Anxiety	Lorazepam 0.5-2 mg PO/IV q4h PRN Diazepam or Clonazepam PRN (see antispasmodics above)	10	
Bisphosphonates Cancer bone pain	Zoledronic acid 4 mg IV over 15 min		q4 weeks
	Pamidronate 90 mg IV over 2 hrs		q4 weeks
	Radiopharmaceuticals		XRT consult
Corticosteroids Nerve edema, compression; cancer bone pain	Dexamethasone 4-8 mg PO/IV BID	24	
	Prednisone 10 mg PO daily-TID	80	
Local anesthetics Neuropathic pain	Lidocaine patch 1-3 patches TD 12h on/12h off		
	Mexilitene 150 mg PO daily-BID	1200	150 mg q7d TID-QID
NSAIDs Musculoskeletal, inflammation, bone pain	Ibuprofen 200-800 mg PO TID-QID	3200	
	Salsalate 500-1500 mg PO BID	3000	
	Naproxen 220-500 mg PO BID	1000	
	Nabumetone 500-1000 mg PO daily-BID	1500	
	Celecoxib 100-200 mg PO daily-BID	400	
	Diclofenac 50 mg PO BID-TID	150	
	Acetaminophen 325-1000 mg PO TID-QID	4000	3000 mg elderly 2000 mg hepatic impairment

***Disclaimer: Not all indications are FDA approved**

Prevention/Treatment of Major Opioid Side Effects

Side Effect	Medication, Dose, Route, Frequency
Respiratory Depression	Respiratory rate < 8/min or severe sedation: Dilute 0.4 mg naloxone in 9 ml normal saline to 0.04 mg/ml IV, titrate to effect Duration of action (30-45 min.) is less than duration of opioid. Repeat doses may be needed. Always arouse patient first. Caution with opioid tolerant patients.
Sedation	Tolerance usually develops. Hold sedating medications; reduce dose. Consider CNS stimulants (e.g. increase caffeine intake, methylphenidate, dextroamphetamine, modafinil).
Constipation	Senna one tab PO BID, titrate to effect, up to 4 tabs BID Docusate sodium 100-200 mg PO BID-TID (use with laxative) Bisacodyl 5-15 mg PO daily; 10 mg PR daily Lactulose 15-60 ml PO daily; 30-60 ml q4 hr severe constipation Miralax® 17 gm with 8 oz PO q HS Milk of magnesia 15-60 ml PO q HS
Nausea/ Vomiting	Prochlorperazine 5-10 mg PO/IM q 6 hr PRN; SR 15 mg PO q 12 hr PRN; PR 25 mg q 12 hr PRN Metoclopramide 10-20 mg PO/IV q 4 hr PRN Ondansetron 4 mg PO/IV q 6 hr PRN Phenergan 6.25-25 mg PO/IV q 6 hr PRN (Caution: give slow IVP to avoid tissue necrosis) Scopolamine transdermal 1.5 mg q 72 hr PRN
Pruritis	Diphenhydramine 12.5-25 mg PO/IV q 6 hr PRN Nalbuphine 2.5-5 mg IV q 4 hr PRN (when caused by epidural/intrathecal analgesia only)

Starting **Initial** IV PCA Prescription Ranges for Acute/Postoperative Pain in Opioid-Naïve Adults

UCH Standard Concentrations	Loading Dose* (repeat PRN)	Basal Dose** (normally not recommended)	Demand (PCA) Dose	Lock-out (min.)
Morphine 1 mg/ml	2-4 mg	0-1 mg/hr	0.5-2 mg	8-10
Hydromorphone 0.2 mg/ml	0.4-0.8 mg	0-0.2 mg/hr	0.1-0.4 mg	6-10
Fentanyl 10 mcg/ml	10-25 mcg	0-10 mcg/hr	10-25 mcg	6-8

*Usually not needed in patients already receiving opioids prior to starting IV PCA

**Basal rates in opioid-naïve patients should be used with caution. Demand dose only is the safest starting mode (especially for high risk patients); start with demand only and add basal as needed.

DISCLAIMER: The intent of this guide is to provide a brief summary of commonly used analgesics. It is not a complete pharmaceutical review. All medications must be administered only with MD or authorized allied health provider orders. Absolutely no liability will be assumed for use of this guide. **Not all medications listed are UCH P&T formulary approved.**

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Pain Classification

Pain Type / Etiology	Descriptors	Treatment Choice
Somatic (well localized) Fractures; arthritis; osteoporosis; injury to deep musculoskeletel structures, or superficial cutaneous tissues; bone and spine metastasis	Dull, achy, throbbing, sore	NSAIDs, ± opioids, steroids, muscle relaxants, bisphosphonates, radiation therapy
Visceral (poorly localized) Originates in deep organ; often referred to dermatomes innervated by same fibers; post abdominal or thoracic surgery; bowel obstruction; venous occlusion, ischemia; liver metastasis, ascites; pancreatitis	Squeezing, pressure, cramping, distention, deep, stretching, bloated, diffuse	Opioids (caution in bowel obstruction), NSAIDs
Neuropathic (deafferentation) Nerve damage by tumor or injury (cervical, brachial, lumbar plexopathies); spinal cord compression; postherpetic neuralgia; post surgical pain syndromes; post stroke pain; diabetic neuropathy; peripheral neuropathies from tumor chemotherapy, or radiation.	Burning, shooting, numb, tingling, radiating, "like a fire", lancinating, electrical or shock-like sensation, "pins and needles"	Anticonvulsants, Antidepressants, local anesthetics, ±opioids, ±steroids, nerve blocks
Psychologic	All encompassing, "everywhere"	Support, counseling, nonpharmacologic approaches, psychiatric medications

Intravenous Non-Steroidal Anti-inflammatory Drugs (NSAID)

Indications: Acute/post-operative pain; opioid sparing. Especially helpful in bone and musculoskeletal pain, chest tube pain, or inflammation.

Ketorolac tromethamine (Toradol®): Loading dose not required.
15-30 mg IV q6 h prn < 65 yo
15 mg IV q6 h prn > 65 yo < 50 kg, frail or renally impaired
Doses as low as 7.5 mg IV q 6 h have been shown effective
Do not exceed 5 days of therapy due to increased GI risk
Precautions: Hypovolemia; renal toxic drugs (Gentamicin)

Acetaminophen IV (Ofirmev®):
1000 mg IV q6 h or 650 mg q4 h, ≥13 yo and >50 kg. Max. daily dose 4000 mg
15mg/kg q6 h or 12.5 mg/kg q4 h, 2-12 yo or < 50 kg. Max. daily dose 75 mg/kg

Ibuprofen (Caldolor®): 400-800 mg IV q6 h prn. Max. daily dose 3200 mg
Do Not use after Coronary Artery Bypass Graft (CABG)

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Analgesic Reference Guide©

Principles of Pain Management

- **Acute Pain Treatment**
  - Mild pain (1-3/10) is treated with a nonopioid (acetaminophen or NSAID) ± adjuvant analgesics.
  - Moderate pain (4-6/10) is treated with a short-acting, immediate release PO/IV opioid with slow titration, + nonopioid, ± adjuvant analgesics.
  - Severe pain (7-10/10) is treated with a short–acting, immediate release PO/IV opioid with rapid titration, + nonopioid, ± adjuvant analgesics.
- **Chronic/Persistent Pain Treatment**
  - Nonopioid and adjuvant medications are emphasized; however, long acting opioid analgesics may also be required in some patients.
  - Short acting PO opioids administered PRN may be required for breakthrough pain during dose titration on long acting opioids.
  - Rescue dosing for short acting PO opioids used for breakthrough pain is calculated at 10-20% of the total 24 hour long acting opioid dose and administered q 2 hr PRN.
- **Nonpharmacologic pain management approaches** should be considered at all levels of acute and chronic pain.
- **Additional Considerations:** Analgesic choice should also be based on the patient's previous experience with the medication, age, physical condition (e.g., renal and hepatic function), appropriate route of administration, response to the prescribed regimen, provider recommendations, and possible interactions with current therapies.

Opioid Equianalgesic Chart (Use as a Guideline Only)

Doses listed in **Bold** are on UCH formulary. Comparative costs ($ least - $$$$ most)

Equianalgesic Conversions:
1. When converting from one drug to another, the calculated equianalgesic dose is just an estimate, not the usual starting dose. 2. Individualize and titrate dose according to patient age, condition, history, opioid tolerance, response, and the clinical situation. 3. Reduce calculated dose by 25-50% for safety; reduce by another 25-50% in the elderly; reduce by another 25% in hepatic or renal impairment. 4. Unless otherwise stated, t½ of opioids ranges from 2-3 hours.

Approximate Equianalgesic Conversions of Morphine Among Routes of Administration

Intrathecal	Epidural	Parenteral	Oral
1 mg	10 mg	100 mg	300 mg

Opioid Agonists		Equianalgesic Doses: Parenteral (mg)	Equianalgesic Doses: Oral (mg)	Dose Interval (hours)	
Morphine		10[1]	30	3-4	Active Metabolites: M6G, more potent and longer half-life than morphine; M3G may accumulate in renal impairment and cause myoclonus, hyperalgesia. Systemic vasodilation due to histamine release. Injection: **0.5**, **1**, **2, 4, 8**, **10**, **15, 25, 50 mg/ml**. Tablet: **15**, 30 **mg**; Oral solution **10** & **20 mg/5 ml; 20 mg/1 ml**. Suppository: 5, 10, 20, **30** mg. Sublingual: 20-30% bioavailability. $$
Morphine SR/ER		--	30	12-24	Sustained release: Do not crush. Morphine Sulfate SR/ER. Tablet: **MS Contin®,** Oramorph® SR: **15, 30,** 60**, 100,** 200 **mg** q12 hr. Capsule: Avinza® 30, 45, 60, 75, 90, 120 mg q24 hr; Kadian® 10, 20, 30, 50, 60, 80, 100, 200 mg q12-24 hr, may be opened and given by 16F G-tube or sprinkled on apple sauce immediately prior to ingestion (do not chew); Embeda® (morphine sulfate/naltrexone hydrochloride ER) 20 mg/ 0.8 mg, 30 mg/1.2 mg, 50 mg/2 mg, 60 mg/2.4 mg, 80 mg/3.2 mg, 100 mg/4 mg q12-24h, may be opened and sprinkled on apple sauce immediately prior to ingestion (do not chew). REMS[3]. $$$
Codeine		130	200 NR	3-4	Use for mild to moderate pain and as antitussive; more constipating than other opioids. Injection: 15, 30 mg/ml. Tablet: 15, **30**, **60** mg; **codeine/acetaminophen: 30 mg/300 mg** (**Tylenol #3®**), 60 mg/300 mg (Tylenol #4®). Oral solution: **codeine 12 mg/acetaminophen 120 mg per 5 ml**. $-$$
Hydrocodone		--	30 NR	3-4	Use for mild to moderate pain. Tablet: **hydrocodone mg/acetaminophen mg: 5/500**, 7.5/750, 10/660 (**Vicodin®**); 5, 7.5, 10/325, 500 (Norco®, Lortab®); 10/650 (Lorcet®); 5, 7.5, 10/400 (Zydone®); Solution: 7.5/325, 500 per 15 ml (Hycet®, Lortab®). Hydrocodone mg/ibuprofen mg 2.5, 5, 7.5, 10/200 (Vicoprofen®). Additional formulations available. Starting Jan 2014 each tablet/capsule will be FDA limited to acetaminophen 325 mg or less. $-$$
Hydromorphone		1.5	7.5	3-4	No active metabolites. Injection: **1, 2, 4**, **10** mg/ml. Tablet: **2**, 4, 8 **mg**. Oral solution: 1 mg/ml. $$.
Hydromorphone ER		--	7.5	24	Extended release: Do not crush. Hydromorphone ER tablet: 8, 12, 16 mg (Exalgo®). REMS[3]. $$$
Fentanyl		0.1	See Comments	0.5-1	Drug of choice in patients with renal and liver disease. Injection: **50 mcg/ml**. Multiple formulations only for breakthrough cancer pain, refer to manufacturer's data for dosing/converting: Actiq® transmucosal lozenge; 200, 400, 600, 800, 1200, 1600 mcg. Fentora® buccal tablets, 0.1, 0.2, 0.3, 0.4, 0.6, 0.8 mg. Lazanda® nasal spray 100 mcg, 200 mcg/spray. Onsolis® buccal film 200, 400, 600, 800, 1200 mcg. Abstral® sublingual tablet100, 200, 300, 400, 600, 800 mcg. Subsys® sublingual spray 100 mcg, 200 mcg, 400 mcg, 600 mcg, 800 mcg. $$$$
Fentanyl Transdermal		See Comments		72	Extended Release: Do not cut. Transdermal patch (Duragesic®), **12**, **25, 50, 75, and 100 mcg/hr**. Approximate equianalgesic conversion: divide total 24-hour oral morphine dose mg by 2 to get fentanyl dose in mcg/hr. Reaches therapeutic serum level 13-24 hr after initial application with peak level between 24-72hr; *lasts 17-24 hr after removal.* Use with caution in cachectic or debilitated patients as they may have altered pharmacokinetics due to poor fat stores or muscle wasting. REMS[3]. $$
Meperidine		Not Recommended for Pain		NR	Toxic metabolite Normeperidine has t½ of 15-40 hr, accumulates with repetitive doses, causing CNS excitation which may result in headaches, altered mental status, and seizures. Contraindicated in patients with impaired renal function. Injection: **25, 50, 75, 100 mg/ml**. Tablet: 50,100 mg (Demerol®). Solution: 10 mg/ml; 10, 50 mg/5 ml. $$
Methadone	**acute**	10	20	6-8	Warning: Careful titration and monitoring due to long and variable t½ of 13-100 hr and QT_C prolongation; accumulates on days 2-5; high inter-patient variability in metabolism and elimination. Usual initial dose 2.5-5 mg PO q6-12 hr. Increase dose no sooner than every 3-5 days. For chronic pain the daily morphine:methadone ratio is: 3:1 < 100 mg morphine, 5:1 if 101-300 mg morphine, 10:1 if 301- 600 mg morphine, 12:1 if 601- 800 mg morphine, 15:1 if 801-1000 mg morphine, 20:1 if > 1000 mg morphine. Injection: **10 mg/ml**. Tablet: **5, 10 mg**. Solution: **5 mg/5 ml, 10 mg/ml**. Contact the Acute Pain Service or the Palliative Care Service for assistance with conversion or initiation. If used for substance abuse treatment, contact Pharmacy to get assistance with mandatory Colorado state dose verification form. REMS[3]. $
	chronic	2	3	8-12	
Oxycodone		--	20	3-4	Tablet: **5, 10,** 15, 30 **mg** (Roxicodone®); **oxycodone mg/acetaminophen mg: 5/325**, 2.5, 7.5, 10/325, 7.5/500, 10/650 **(Percocet®);** 5/325, 500 (Roxicet®), 5/aspirin 325 mg (Percodan®). 5/ibuprofen 400 mg (Combunox®). Capsule: 5 mg (OxyIR®); 5 mg oxycodone/325 mg acetaminophen (Tylox®). Solution: 5 mg/5 ml, 20 mg/ml (Roxicodone®); 5/325 /5 ml (Roxicet®). Additional formulations available. Starting Jan 2014 each tablet/capsule will be FDA limited to acetaminophen 325 mg or less. $-$$$
Oxycodone CR		--	20	12	Controlled release: Do not crush. Oxycodone CR tablet: **10**, 15, **20**, 30, **40**, 60, **80** mg (Oxycontin®). REMS[3]. $$
Oxymorphone		1	10	4-6	Tablet: 5,10 mg (Opana®). Take on an empty stomach. Contraindicated in patients with moderate to severe hepatic impairment. Use with caution in mild hepatic impairment and in moderate to severe renal impairment. $$$$
Oxymorphone ER		--	10	12	Extended release: Do not crush. Tablet: 5, 7.5, 10, 15, 20, 30, 40 mg (Opana® ER). Take on an empty stomach. Indicated in patients on opioids for 7 days or more. Contraindicated in patients with moderate to severe hepatic impairment. Use with caution in mild hepatic impairment and in moderate to severe renal impairment. Co-ingestion with alcohol can result in increased plasma levels and fatal overdose. REMS[3]. $$$$
Tapendatol		--	75[2]	4-6	Tablet: 50, 75, 100 mg (Nucynta®). Weak opioid agonist for moderate to severe acute pain. Inhibits norepinephrine reuptake. Max dose 600 mg/day. Do not take with extended release Nucynta® ER. $$$
Tapentadol ER		--	75[2]	12	Extended release: Do not crush. Tablet: 50, 100, 150, 200, 250 mg (Nucynta® ER). Weak opioid agonist for moderate to severe chronic pain. Inhibits norepinephrine reuptake. Max dose 500 mg/day. REMS[3]. $$$
Tramadol		--	300[2] NR	4-6	Tablet: **50 mg** (Ultram®); 37.5 mg tramadol + 325 mg acetaminophen (Ultracet®). Weak opioid agonist for moderate to moderately severe acute pain. Inhibits reuptake of norepinephrine and serotonin. Do not exceed 400 mg/day; 300 mg/day for > 75 yo. Decrease dose by 50% in patients with renal impairment. Lowers seizure threshold, consult drug reference for drug interaction seizure risks. $$$
Tramadol ER		--	300[2] NR	24	Extended release: Do not crush. Tablet: 100, 150, 200, 300 mg (Ultram® ER). Weak opioid agonist for moderate to moderately severe chronic pain. Inhibits reuptake of norepinephrine and serotonin. Do not exceed 300 mg/day. Decrease dose by 50% in patients with renal impairment. Lowers seizure threshold, consult drug reference for drug interaction seizure risks. $$$
Partial Agonist					
Buprenorphine		0.3	NA	3-4	Injection: **0.3 mg/ml** (Buprenex®). Partial opioid agonist for moderate to severe chronic pain. Will antagonize other systemic opioids and may precipitate withdrawal syndrome. $
Buprenorphine Transdermal		--	NA	7 days	Transdermal Patch (Butrans®) 5 mcg/hr, 10 mcg/hr, 20 mcg/hr. Partial opioid agonist for moderate to severe chronic pain. Will antagonize other systemic opioids and may precipitate withdrawal syndrome. For conversion from other opioids to Butrans, taper the patient's current around-the-clock opioids for up to 7 days to no more than 30 mg of morphine or equivalent per day before beginning treatment with Butrans. Max dose is 20 mcg/hr patch due to risk of QT_C prolongation. REMS[3]. $$$

[1]Not the usual starting dose; [2]Limited conversion data, use caution; NR = not recommended at that dose; NA = equianalgesic dose is not available; [3]REMS: All extended-release and long-acting opioids are subject to an FDA Risk Evaluation and Mitigation Strategy.