Pain Management & Dosing Guide™

*See disclaimer. Dosages and opioid conversions cannot account for differences in genetics and pharmacokinetics.

PAMI
Pain Assessment and Management Initiative

pami.emergency.med.jax.ufl.edu/

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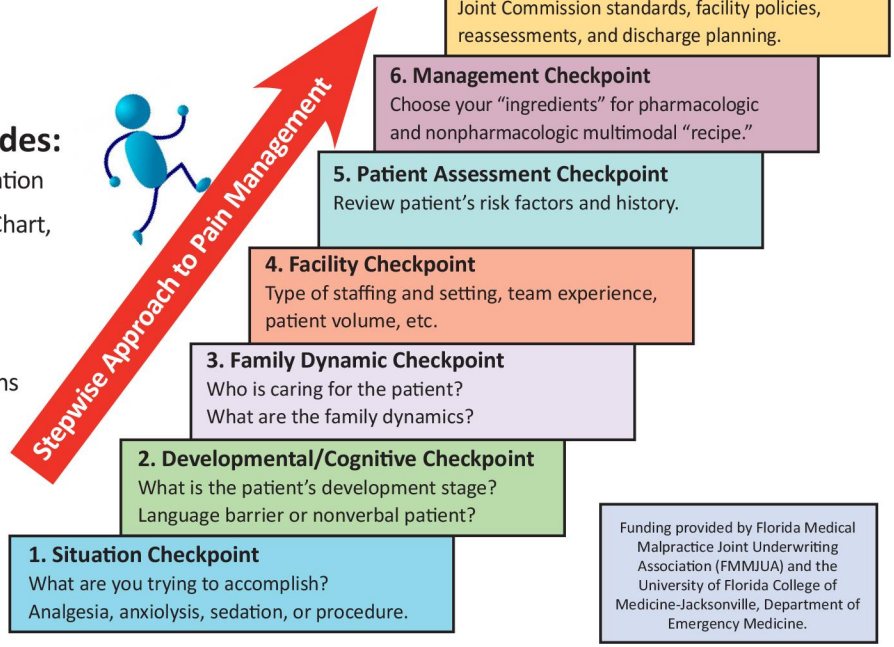
Pain Management and Dosing Guide Includes:

- Stepwise Approach to Pain Management and Procedural Sedation
- Non-opioid Analgesics, Opioid Prescribing and Equianalgesic Chart, and Opioid Cross-Sensitivities
- Intranasal and Nebulized Medications
- Procedural Sedation and Analgesia (PSA) Medications
- Pain Management, Discharge and Patient Safety Considerations
- Nerve Blocks, Neuropathic and Muscle Relaxer Medications
- Ketamine Indications and Dosing
- Topical and Transdermal Medications
- Nonpharmacologic and other Interventions

Take a video tour of the dosing guide!

PANEL A



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PANEL B

Non-Opioid Analgesics*

Generic (Brand)	Adult	Pediatric (<12 yo)
Acetaminophen (Tylenol®)	325-650 mg PO q 4-6 h Max: 4 g/day	15 mg/kg PO q 4-6 h Max: 75 mg/kg/day
Acetaminophen IV (Ofirmev®) Use only if not tolerating PO	1 g IV q 6 h Max: 4 g/day or 650 mg q 4 h prn pain	<50 kg 15 mg/kg IV q 6 h or 12.5 mg/kg IV q 4 h prn pain Max: 75 mg/kg/day
Celecoxib (Celebrex®)	100-200 mg PO daily to q 12 h Max: 400 mg/day	≥ 2 yo to adult 10-25 kg: 50 mg PO BID; > 25 kg: 100 mg BID
Ibuprofen (Motrin®)	400-800 mg PO q 6 to 8 h Max: 3200 mg/day	10 mg/kg PO q 6 to 8 h Max: 40 mg/kg/day or 2400 mg/day
Ketorolac (Toradol®)	15 mg IV or 30 mg IM q 6 h Max: 120 mg/d x 5 day	0.5 mg/kg IM/IV q 6 h up to 72 h Max: 30 mg/dose IM, 15 mg/dose IV
Naproxen (Naprosyn®)	250-500 mg PO q 12 h	≥ 2 yo 10 mg/kg/day PO div q 8-12 h
Meloxicam (Mobic®)	7.5-15 mg PO daily	≥ 2 yo 0.125 mg/kg/dose NTE adult dose

***Avoid NSAIDs in renal dysfunction, PUD, CHF, < 6 mo of age, >20 wks pregnant.** Use with caution in elderly and those with cardiovascular risks. Give with food.
For pediatrics, do not exceed adult dosage.

Opioid Prescribing and Equianalgesic Chart (*based upon 2019 ASHP recommendations)

Generic (Brand)	Onset (O) and Duration (D)		*Approximate Equianalgesic Dose		Recommended *STARTING* dose for ADULTS		Recommended *STARTING* dose for CHILDREN (> 6 mo)	
	Oral	IV	Oral	IV	Oral	IV	Oral	IV
Morphine (MSIR®) [CII]	O: 30-60 min D: 3-6 h	O: 5-10 min D: 3-6 h	25 mg	10 mg	5-10 mg q 4 h	2-4 mg q 2-4 h	0.3 mg/kg q 4 h	0.1 mg/kg q 2-4 h
Hydromorphone (Dilaudid®) [CII]	O: 30 min D: 4-6 h	O: 5 min D: 3-4 h	5 mg	2 mg	2-4 mg q 4 h	0.2-1 mg q 2-3 h	0.06 mg/kg q 4-6 h	0.015 mg/kg q 2-4 h
Hydrocodone/APAP 325 mg (5, 7.5, 10 mg) [CII] (7.5 mg/325 mg per 15 mL)	O: 30-60 min D: 4-6 h	—	25 mg	—	5-10 mg q 6 h	—	≥ 2 yo: 0.1-0.15 mg/kg q 4-6 h	—
Fentanyl [CII] (Sublimaze® Duragesic®) *Patch for opioid tolerant patients ONLY*	Transdermal O: 12-24 h D: 72 h per patch	O: <1 min D: 30-60 min	—	150 mcg (0.15 mg)	Do not use in opioid naive pt.	50 mcg q 1-2 h	Do not use in opioid naive pt.	1-2 mcg/kg q 1-2 h (max 50 mcg/dose)
Methadone (Dolophine®) [CII] *Opioid tolerant patients ONLY*	O: 30-60 min D: >8 h (chronic use)	—	Variable	Variable	2.5 mg q 8-12 h	—	0.7 mg/kg/day PO/SC/IM/IV ÷ q 4-6 h prn severe chronic pain	
Oxycodone 5, 15, 30 mg (Roxicodone®), Oxycodone 5, 7.5, 10 mg/ APAP 325 mg (Percocet®) [CII]	O: 10-15 min D: 3-6 h	—	20 mg	—	5-10 mg q 6 h	—	0.05-0.15 mg/kg q 4-6 h	—
Tramadol (Ultram®) [CIV] Not recommended in nursing mothers.	O: 1 h D: 3-6 h	—	120 mg	—	50-100 mg q 6 h Max: 400 mg/day	—	—	—
Tapentadol (Nucynta®) [CII]	O: 30 min D: 4-6 h	—	100 mg	—	50 mg q 4-6 h	—	—	—

Opioid Cross-Sensitivities

Phenanthrenes (related to morphine): morphine, codeine, oxycodone, hydrocodone, hydromorphone
Phenylpiperidines (related to meperidine): meperidine, fentanyl
Risk of cross-sensitivity in patients with allergies is greater when medications from the same opioid family are administered.

Intranasal* and Nebulized Medications

Generic	Dose	Max Dose	Comments
Fentanyl	IN: 1.5-2 mcg/kg q 1-2 h Neb: 1.5-4 mcg/kg	4 mcg/kg or 100 mcg	Divide dose equally between each nostril
Midazolam (5 mg/mL)	IN: 0.3 mg/kg	10 mg or 1 mL per nostril (total 2 mL)	Divide dose equally between each nostril
Lidocaine	Neb: 4% (40 mg/mL) 100-200 mg or 2.5-5 mL	4.5 mg/kg total or 300 mg	>5 mg/kg associated with serious toxicity

*Use MOST concentrated form available with atomizer. Limit 1 mL/nare. Ketamine in separate table.

Lidocaine for renal colic: 1.5 mg/kg IV (Max 200 mg) in 100 mL NS over 10-15 min. Cardiac monitoring preferred.
Contraindications: Pregnancy, cardiac arrhythmias, CAD, age >65 yo, hepatic/renal failure, epilepsy, Amide allergy

PANEL C

Procedural Sedation and Analgesia Medications

Generic (Brand)	Adult	Pediatric	Comments
Ketamine (Ketalar®)	IV 0.5-1.0 mg/kg IM 4-5 mg/kg	>3 mo: IV 1-2 mg/kg; additional doses 0.5 mg/kg IV q 10-15 min prn; IM 4 - 5 mg/kg	Small risk of laryngospasm increases with active asthma, URI and procedures involving posterior pharynx; vomiting is common, consider pretreatment with anti-emetic.Not recommended in patients <3 mo.
Midazolam (Versed®)	IV 0.05-0.1 mg/kg IV slow push over 1-2 min	IV 0.05-0.1 mg/kg IN 0.2-0.3 mg/kg (IN max 10 mg)	Initial max dose 2 mg. Max total dose in >60 yo is 0.1 mg/kg Decrease dose by 33-50% when given with opioid
Propofol (Diprivan®)	IV 0.5-1 mg/kg slow push (1-2 min); additional doses 0.25-0.5 mg/kg over 1-3 min	IV 1 mg/kg slow push (1-2 min); additional doses 0.5 mg/kg	Risk of apnea, hypoventilation, respiratory depression, rapid changes in sedative depth, hypotension; provides no analgesia
Etomidate (Amidate®)	IV 0.1 - 0.2mg/kg; additional doses 0.05mg/kg		Risk of myoclonus (premedication w/ benzo or opioid can decrease), pain with injection, nausea and vomiting, risk of adrenal suppression; provides no analgesia
Ketamine + Propofol	—	IV ketamine 0.75 mg/kg + propofol 0.75 mg/kg. Additional doses: ketamine 0.5 mg/kg, propofol 0.5-1 mg/kg	See ketamine and propofol comments respectively
Dexmedetomidine (Precedex®)	IV 1 mcg/kg loading dose (over 10 min) followed by 0.5 to 2 mcg/kg/h continuous infusion. Use 0.5 mcg/kg for geriatric patients	IV 0.5–2 mcg/kg loading dose (over 10 min) followed by 0.5 to 2 mcg/kg/h continuous infusion IN 2-3 mcg/kg	Risk of bradycardia, hypotension, especially with loading dose or rapid infusions, apnea, bronchospasm, respiratory depression
Nitrous oxide	—	50% N2O/50% O2 inhaled	Do not use if acute asthma exacerbation, suspected pneumothorax/other trapped air or head injury with altered level of consciousness
Morphine	IV 0.05-0.1 mg/kg or 5-10 mg	IV 0.1-0.2 mg/kg, titrated to effect	Monitor mental status, hemodynamics, and histamine release. Requires longer recovery time than fentanyl. Difficult to titrate during procedural sedation due to slower onset and longer duration of action. Reduce dosing when combined with benzodiazepines (combination increases risk of respiratory compromise)
Fentanyl	IV 0.5-1 mcg/kg	1-3 yo: 2 mcg/kg; 3-12 yo 1-2 mcg/kg	100 times more potent than morphine; Rapid bolus infusion may lead to chest wall rigidity. Reduce dosing when combined with benzodiazepines and in elderly. Preferred agent due to rapid onset and short duration.

Pain Management Considerations

- Type of pain: nociceptive, neuropathic, inflammatory
- Acute vs. chronic vs. acute on chronic pain exacerbation
- Pain medication history: OTC, Rx and PDMP
- Patient factors: genetics, culture, age, comorbidities, past pain experiences and mental health
- **For pediatrics, do not exceed adult dosage**
- Pharmacologic Interventions: systemic, topical, transdermal, nerve block
  - Dose based on ideal body weight
- Nonpharmacologic Interventions
- Refer to pain, palliative or other specialists for advanced treatment

Reassessment

- Reassess pain and monitor for medication efficacy and side effects
- Use scale that is age and cognitively appropriate
- If no improvement, adjust regimen

Discharge Planning & Patient Safety

- Assess and counsel regarding falls, driving, work safety, and medication interactions
- Bowel regimen for opioid induced constipation
- Vital signs and oral intake before discharge
- Document all pain medications administered and response at time of disposition
- Consider OTC and nonpharmacologic options
- Can patient implement pain management plan?
  - insurance coverage, transportation, etc.

For more information on Discharge Planning, visit pami.emergency.med.jax.ufl.edu/resources/discharge-planning

PANEL D

Nerve Blocks

Type of Block	General Distribution of Anesthesia
Interscalene Plexus Block	Shoulder, upper arm, lateral 2/3 clavicle
Supraclavicular Plexus Block	Upper arm, elbow, wrist and hand
Infraclavicular Plexus Block	Upper arm, elbow, wrist and hand
Axillary Plexus Block	Forearm, wrist and hand. Elbow if including musculocutaneous nerve
Median Nerve Block	Anterior forearm, lateral hand and digits 1-4 ½
Radial Nerve Block	Lateral arm, posterior forearm, dorsal hand, digits 1-4 ½
Ulnar Nerve Block	Medial Forearm, medial hand and digits 4 ½ to 5
Femoral Nerve Block	Anterior thigh, femur, knee and medial leg distal to the knee
Popliteal Nerve Block	Posterior lateral leg distal to knee, ankle and foot
Tibial Block	Plantar surface of foot
Superficial Peroneal Block	Dorsal surface of foot
Deep Peroneal Block	Web space between 1st and 2nd toes
Saphenous Nerve Block	Distal medial thigh, medial knee, medial ankle and medial foot
Sural Nerve Block	Lateral ankle and foot

Local Anesthetics†	Onset	Duration without Epi (h)	Duration with Epi (h)	Max Dose without Epi, mg/kg	Max Dose with Epi, mg/kg
Lidocaine (1%)	Rapid	0.5–2	1–6	4.5 (300 mg)	7 (500 mg)
Bupivicaine (0.5%)*	Slow	2-4	4-8	2.5	3
Mepivicaine (1.5%)	Rapid	2-3	2-6	5	7
2-Chloroprocaine (3%)	Rapid	0.5-1	1.5-2	10	15
Ropivicaine (0.5%)	Medium	3	6	2-3	2-3

*Most cardiotoxic †1% = 10mg/ml, 0.5% = 5mg/ml

Neuropathic Pain Medications

Generic (Brand)	Starting dose	Max dose
Gabapentin* (Neurontin®)	300 mg PO QHS to TID	3600 mg/day
Pregabalin* (Lyrica®) [CV]	50 mg PO TID	600 mg/day**
SNRIs: Duloxetine (Cymbalta®) Venlafaxine ER (Effexor XR®)	30 mg PO daily† 37.5 mg PO daily	60 mg/day** 225 mg/day
TCAS: Amitriptyline (Elavil®) Nortriptyline (Pamelor®)	25 mg PO QHS 25 mg PO QHS	150 mg/day 150 mg/day

See labeling reccomendations for dose titration. †30 mg daily for at least 7 days to decrease nausea
*Requires dose adjustment based on renal function **Varies depending on indication

Muscle Relaxer Pain Medications

Generic (Brand)	Beginning dose	Max dose
Baclofen (Lioresal®)	5 mg PO TID	80 mg/day
Cyclobenzaprine (Flexeril®)	5 mg PO TID	30 mg/day
Tizanidine (Zanaflex®)	2 mg po q 6-8 h prn	36 mg/day
Methocarbamol (Robaxin®)	1-1.5 g PO TID to 4x/day x 48-72 h, then 500-750 mg PO TID; 1 g q 8 h IV	8 g/day (PO) 3 g/day IV
Diazepam (Valium®) [CIV]	Adult: 2-10 mg PO q 6-8 h; 5-10 mg IV/IM Ped: (>6 mos) 1 mg to 2.5 mg PO q 8 h prn; 0.04-0.2 mg/kg IV/IM q 2-4 h	Peds: 0.6 mg/kg/8h IV/IM to adult max

Ketamine (Ketalar®) Indications and Dosing

Indications	Starting Dose
Procedural Sedation	**IV:** Adult 0.5-1.0 mg/kg; Ped 1-2mg/kg; **IM:** 4-5 mg/kg
Sub-dissociative Analgesia^	**IV:** 0.1 to 0.3 mg/kg, Max initial bolus 45 mg **IM:** 0.5-1.0 mg/kg; **IN:** 0.5-1.0 mg/kg
Excited Delirium Syndrome	**IV:** 1 mg/kg; **IM:** 4-5 mg/kg

^Consider in opioid tolerant patients or those with contraindications to opioids. Administer IV over 10-15 minutes to minimize side effects. SQ dose same as IV. For IV-can dilute dose in 10 ml NS and administer as IV slow push over 5-10 min. Can also be given as a continuous infusion.

PANEL E

Topical and Transdermal Medications*

Class	Formulations (Generic & OTC)	Indications	Recommended Dosing
Counterirritants & Rubefacients (cream, lotion, gel, ointment, spray, and patch)	**Numerous OTC formulations** & varying combinations of camphor, salicylates, and/or menthol (Ex. BENGAY®, Biofreeze®) **Salonpas® Patch** (Methyl salicylate + menthol)	Musculoskeletal pain: strains, sprains, backache	Generally, > 12 yo: Apply thin layer to affected area and massage up to QID. Check labeling for age cutoff Q 8-12 h Max 2 patches/day X 3 consecutive days
Capsaicin <1% (alone or in combination with other products)	Available as multiple OTC formulations +/- camphor or menthol (Ex. Theragen®, Zostrix®, Tiger Balm®)	Musculoskeletal pain: strains, sprains, backache. Arthritis. Post-herpetic neuralgia. Peripheral neuropathy.	Up to QID
NSAIDs: Diclofenac *Combining topical and oral NSAIDs not recommended*	**Pennsaid®*** 1.5% solution 2% solution pump **Voltaren** 1% gel (OTC- 2 g=2.25 in, see package dosing card) **Flector ®** 1.3% patch	Osteoarthritis Osteoarthritis Acute pain: sprains, strains, contusions	*Pediatric dosing unavailable for Pennsaid 1.5%: 40 drops QID 2 pumps (40 mg) BID to affected knee/joint 2 g upper extremity QID (max 8 g/day); 4 g lower extremity QID (max 16 g/day); 32 g/day max all joints 1 patch (180 mg) BID (to most painful area; ≥ 6yo)
Lidocaine	**5% patch** (Lidoderm®) **4% patch** (+/- menthol) **4% cream** (OTC) **4% L.M.X.4® cream** (OTC) *Onset 30 min; Duration 60 min* **2% gel/jelly, 5% ointment, or 2% viscous solution** **J-Tip™ with buffered lidocaine** (https://jtip.com/)	Post-herpetic neuralgia Musculoskeletal pain Burns, cuts, insect bites Burns, cuts, insect bites, venipuncture, LP, abscess I &D Catheter/NG tube insertion; stomatitis IV starts: Onset 1-3 min	Adults: q 12 h; max 3 patches at one time Adults and children ≥ 12 yo: q 12 h ≥ 2 years: TID -QID ≥ 2 years, up to 4 times per day. Apply in area <100 cm^2 if < 10 kg; < 600 cm^2 for 10-20 kg
Lidocaine combinations (use gloves, EMLA-cover with occlusive dressing, LET-cover with cotton ball & tape)	**EMLA®** (2.5% Lidocaine 2.5% Prilocaine); *Onset 60 min; Duration 3-4 h; Max appl.=1 h if <3mo/5 kg; otherwise 4 h* **LET** (4% Lidocaine, 1:2,000 Epinephrine, 0.5% Tetracaine) gel or liquid; *Onset 10 min; Duration 30-60 min*	Dermal analgesic of intact skin (abscess I & D, LP, etc.) Wound repair (non-mucosal)	< 3 mo (< 5 kg): up to 1 g on 10 cm^2 area; 3-12 mo (>5 kg): up to 2 g on 20 cm^2; 1-6 yo (>10 kg): up to 10 g on 100 cm^2; 7 yo - adult (>20 kg): up to 20 g on 200 cm^2 3 mL (not to exceed maximal lidocaine dosage of 3-5 mg/kg)
Vapocoolant	**Pain-Ease®**	Cooling intact skin, mucus membranes and minor open wounds	Spray for 4-10 sec from distance of 8-18 cm. Stop when skin turns white. Use with caution in children < 4 yo

*Dosages are guidelines to avoid systemic toxicity in patients with normal intact skin and with normal renal and hepatic function. Use gloves to apply and/or wash hands after application. Use with caution in children and older adults with thin skin.

PANEL F

Nonpharmacologic Interventions (Pediatric and Adult)*

Physical (Sensory) Interventions	Cognitive-Behavioral Interventions
Comfort positioning	Psychological preparation, education or coaching
Cutaneous stimulation	Distraction tools: movies, games, videos, apps, toys with light/sound, bubbles, virtual reality
Nonnutritive sucking	Relaxation techniques: breathing, meditation, guided imagery
Pacifier +/- sucrose solution	Music and singing
Pressure, massage, acupuncture or trigger point injections	Aromatherapy
Hot or Cold treatments	Conversation and therapeutic language

*Used alone or in conjunction with pharmacologic interventions. Intervention based on age, developmental stage, setting and situation

For more information, visit: pami.emergency.med.jax.ufl.edu/resources/distraction-toolkit

Patient Educational Pain Videos

- Additional Therapies to help Manage Pain
- Preventing and Relieving Back Pain
- Ways to Manage Chronic Pain
- Pain Medication Safety

All PAMI materials are free access and adaptable to your individual institution.
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