Pain Management & Dosing Guide

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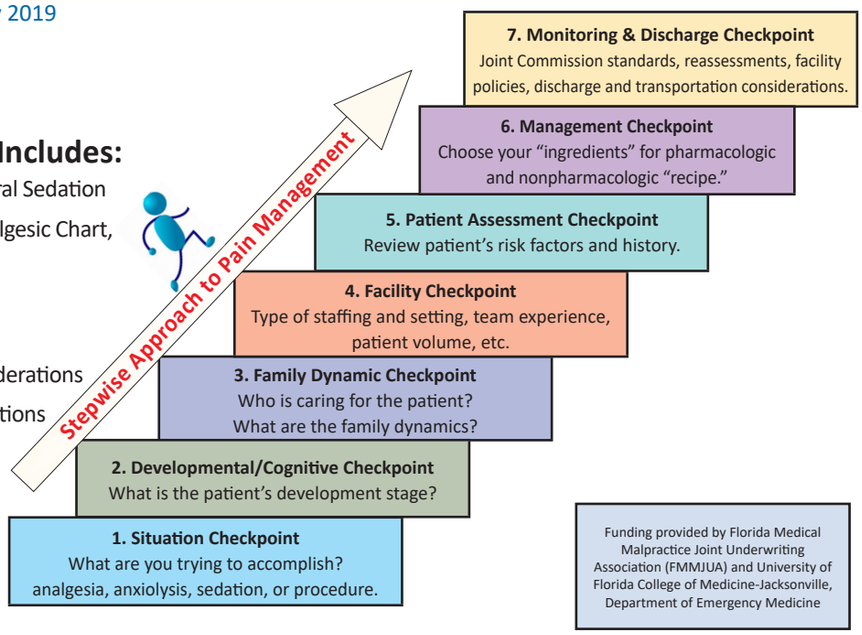
PAMI
Pain Assessment and Management Initiative
http://pami.emergency.med.jax.ufl.edu/

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 Interventions

Take a tour of the dosing guide here!

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 10-15 mg/kg IV q 6 h or 12.5 mg/kg IV q 4 h prn pain Max: 75mg/
Celecoxib (Celebrex®)	100-200 mg PO daily to q 12 h Max: 400 mg/day	>2 yo 50 mg PO 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
Indomethacin (Indocin®)	25-50 mg PO q 6 to 12 h Max: 200 mg/day	1-2 mg/kg PO q 6 to 12 h >6 mo Max: 4 mg/kg/day or 200 mg/day
Ketorolac (Toradol®)	15-30 mg IV/IM q 6 h Max: 120 mg/day x 5 day	0.5-1 mg/kg/dose IM/IV q 6 h Max: 15-30 mg q 6 h x 5 day
Lidocaine IV for renal colic		

*Doses can be scheduled or PRN pain. Avoid NSAIDs in renal dysfunction, PUD, CHF, and if < 6 mo of age. Use with caution in elderly and those with cardiovascular risks.

Opioid Prescribing and Equianalgesic Chart

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	30 mg	10 mg	15-30 mg q 4 h	2-10 mg q 2-4 h	0.3 mg/kg q 4 h	0.1 mg/kg q 2-4 h
Morphine extended release (MS Contin®) [CII]	O: 30-90 min D: 8-12 h	—	30 mg	10 mg	15-30 mg q 12 h	—	0.3-0.6 mg/kg q 12 h	—
Hydromorphone (Dilaudid®) [CII]	O: 15-30 min D: 4-6 h	O: 15 min D: 4-6 h	7.5 mg	1.5 mg	2-4 mg q 4 h	0.5-2 mg q 2-4 h	0.06 mg/kg q 4 h	0.015 mg/kg q 4 h
Hydrocodone/APAP 325 mg (Norco 5, 7.5, 10®) [CII] Hycet (7.5 mg/325 mg per 15 mL)	O: 30-60 min D: 4-6 h	—	30 mg	—	5-10 mg q 6 h	—	0.1-0.2 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: immediate D: 30-60 min	—	100 mcg (0.1 mg)	Transdermal 12-25 mcg/h q 72 h	50 mcg q 1-2 h	Transdermal 12-25 mcg/h q 72 h	1-2 mcg/kg q 1-2 h (max 50 mcg/dose)
Methadone (Dolophine®) [CII] *Opioid tolerant pain patients ONLY*	O: 30-60 min D: >8 h (chronic use)	—	Variable	Variable	2.5-10 mg q 8-12 h	—	0.7 mg/kg/day PO/SC/IM/IV divided q 4-6 h prn severe chronic pain	
Oxycodone 5, 15, 30 mg (Roxicodone®), Oxycodone 5, 7.5, 10 mg/ APAP 325 mg (Percocet®), ER=Oxycontin® [CII]	O: 10-15 min D: 4-6 h	—	20-30 mg	—	5-10 mg q 6 h ER 10 mg q 12 h	—	0.05-0.15 mg/kg q 4-6 h	—
Tramadol (Ultram®) [CIV] ^	O: 1 h D: 3-6 h	—	300 mg	—	50-100 mg q 6 h Max: 400 mg/day	—	—	—

^ Not recommended in nursing mothers.

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: 1.7-3 mcg/kg	3 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
Ketamine	See Ketamine table		
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 the MOST concentrated form available with an atomizer.

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	Risk of laryngospasm increases with active asthma, upper respiratory infection and procedures involving posterior pharynx; vomiting occurs, commonly consider premedication. 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 2 mg/kg ≤ 3 yo slow push; 1.5 mg/kg >3 yo; 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
- 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, please visit http://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, elbow and forearm
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	Hand and Forearm
Radial Nerve Block	Hand and Forearm
Ulnar Nerve Block	Hand and Forearm
Femoral Nerve Block	Anterior thigh, femur, knee and skin over the medial aspect below the knee
Popliteal Nerve Block	Foot and ankle and skin over the posterior lateral portion, distal to the knee
Tibial Block	Foot and ankle
Deep Peroneal Block	Foot (web space between 1st & 2nd toes)
Saphenous Nerve Block	Foot (medial lower leg to mallelous)
Sural Nerve Block	Foot (lateral foot & ankle)

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®)	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

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

Muscle Relaxer Medications

Generic (Brand)	Starting dose	Max dose
Baclofen (Lioresal®)	5 mg PO TID	80 mg/day
Cyclobenzaprine (Flexeril®)	5 mg PO TID	30 mg/day
Methocarbamol (Robaxin®)	1-1.5 g PO TID to 4x/day x 48-72 h, then 500-750 mg PO TID to 4x/day	8 g/day
Diazepam (Valium®)	Adult: 2-10 mg PO q 6-8 h; 5-10 mg IV/IM Ped: (6-12yo): 0.12-0.8 mg/kg/day PO divided q 6-8 h; 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; **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.
Contraindications: Acute schizophrenia, pregnancy. Administer IV over 10-15 minutes to minimize side effects.
*Dosing ranges not well established.

PANEL E

Topical and Transdermal Medications*

Generic (Brand)	Indications	Onset (O) and Duration (D)	Recommended *STARTING* dose for ADULTS	Recommended *STARTING* dose for CHILDREN	Maximum Dose
Diclofenac sodium 1.5%, 2% w/w topical solution (Pennsaid) 1% gel (Voltaren gel)	Osteoarthritis	Variable	1.5% soln: 40 drops QID 2% soln: 2 pumps (40mg) BID to affected knee 1% gel: 2 g for upper ext. or 4 g for lower ext. QID	—	1.5% soln: 40 drops QID 2% soln: 2 pumps (40mg) BID 1% gel (2g): 8 g/d to single joint of **upper** extremity; 1% (4g): 16 g/d to single joint of **lower** extremity
Diclofenac epolamine 1.3% patch (Flector patch)	Acute pain from sprains, strains, contusion	Variable	1 patch (180 mg) BID	—	1 patch BID
Fentanyl (Duragesic®)	Persistent moderate to severe chronic pain *in opioid tolerant patients*	O: 12-24 h D: 72 h per patch	12-25 mcg/h q 72 h		Variable
Capsaicin cream (Theragen®, Zostrix®, Salonpas) Exists as several OTC formulations in combination with camphor and menthol	Strains, sprains, backache or arthritis	Variable	Apply a thin layer to the affected area and gently massage up to QID	>12 yo: Apply a thin layer to the affected area and gently massage up to QID	Up to QID
Pain-Ease® Vapocoolant/Skin Refrigerant	Cooling intact skin and mucus membranes and minor open	O: immediate D: few sec to	—	Spray for 4-10 sec from distance of 8-18 cm.	Stop when skin turns white to avoid frostbite
Lidocaine 5% patch (Lidoderm patch)	Postherpetic neuralgia	Variable	1-3 patches applied once daily, remove after 12 h	—	3 patches in a 12 h period per day
Lidocaine 4% (L.M.X.4®)	Minor cuts, scrapes, burns, sunburn, insect bites, and minor skin irritations	O: 20-30 min D: 60 min	Apply externally		Externally 3-4 times per day. Apply in area less than 100cm² for children less than 10kg. Apply in area less than 600cm² for children between 10 and 20kg
Lidocaine	Foley catheter and nasogastric tube insertion; intubation; nasal packing; gingivostomatitis	O: 2-5 min D: 30-60 min	2% topical gel/jelly, 5% topical ointment, 2% oropharyngeal viscous topical solution		3-5 mg/kg
EMLA (2.5% Lidocaine 2.5% Prilocaine) Cover with occlusive dressing Maximum application time 4 hours	Dermal analgesic (intact skin)	O: 60 min D: 3-4 h	20 gm	3-12 mo (>5 kg): 2 gm 1-6 yo (>10kg): 10 gm 7-12 yo (>20kg): 20 gm	3-12 mo max area 20cm² 1-6 yo max area 100cm² 7-12 yo max area 200cm²
LET (Lidocaine Epinephrine Tetracaine) (gel or liquid)	Wound repair (non-mucosal)	O: 10 min D: 30-60 min	Topical 4% Lidocaine, 1:2,000 Epinephrine, 0.5% Tetracaine		3 mL (not to exceed maximal Lidocaine dosage of 3-5 mg/kg)

*Dosages are guidelines to avoid systemic toxicity in patients with normal intact skin and with normal renal and hepatic function

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
Nonnutritive sucking	Relaxation techniques (breathing, meditation, etc.)
Pacifier +/- sucrose solution	Music and singing
Pressure, massage, acupuncture or trigger point injections	Guided imagery or virtual reality (VR)
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

DISTRACTION TOOLKIT

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For more information on nonpharmacologic interventions or to download a distraction toolkit, visit http://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
https://goo.gl/Sd8siS	https://goo.gl/DxLfYA	https://goo.gl/KoVUFx	https://goo.gl/M9NCJh

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