

Oral Analgesia in Pediatrics

Anesthetic Pearls: Anesthetic Management of Oral Analgesics in Pediatrics

There two type of analgesics available: **non-opioid** and **opioid**. In pediatric patients, the clinician must also keep in mind whether the child can swallow pills or prefers liquid form.

Acetaminophen

Most commonly used non-opioid analgesia is acetaminophen. It is useful in treating mild to moderate pain and is often combined with an opioid for patients in moderate to severe pain.

NSAIDs in children are not much different than in adults. However there is a lower incidence of renal and gastrointestinal side effects in children. They are not recommended for selective surgeries with increase bleeding risks (tonsillectomy).

Opioids

Oral administration is an excellent means of providing analgesia in minor and less painful surgeries. It provides a relatively constant drug level when administered in regular interval. **Codeine and Acetaminophen** is the most commonly prescribed opioid combination for treatment of pain in pediatrics. It is available in elixir form in a 10:1 ratio of Acetaminophen 120 mg + Codeine 12mg in 5 ml of solution. **Oxycodone** can be prescribed for patients with severe pain or inadequate analgesic coverage from Codeine (available in elixir or tablet form). **Methadone** must have individual titration with frequent assessment (oral elixir is available having excellent absorption with 60-90% bioavailability).

TABLE 2. ORAL DOSAGE GUIDELINES FOR COMMONLY USED NONOPIOID ANALGESICS.

DRUG	DOSE FOR PATIENTS <60 kg	DOSE FOR PATIENTS ≥60 kg	INTERVAL	MAXIMAL DAILY DOSE FOR PATIENTS <60 kg	MAXIMAL DAILY DOSE FOR PATIENTS ≥60 kg
	mg/kg	mg		hr	mg/kg
Acetaminophen	10–15	650–1000	4	100*	4000
Ibuprofen	6–10	400–600†	6	40†‡	2400†
Naproxen	5–6†	250–375†	12	24†‡	1000†
Aspirin§	10–15†§	650–1000†	4	80†‡§	3600†

*The maximal daily doses of acetaminophen for infants and neonates are a subject of current controversy. Provisional recommendations are that daily dosing should not exceed 75 mg per kilogram per day for infants, 60 mg per kilogram per day for term neonates and preterm neonates of more than 32 weeks of postconceptional age, and 40 mg per kilogram per day for preterm neonates 28 to 32 weeks of postconceptional age. Fever, dehydration, hepatic disease, and lack of oral intake may all increase the risk of hepatotoxicity.

†Higher doses may be used in selected cases for treatment of rheumatologic conditions in children.

‡Dosage guidelines for neonates and infants have not been established.

§Aspirin carries a risk of provoking Reye's syndrome in infants and children. If other analgesics are available, aspirin should be restricted to indications for which an antiplatelet or antiinflammatory effect is required, rather than being used as a routine analgesic or antipyretic in neonates, infants, or children. Dosage guidelines for aspirin in neonates have not been established.

TABLE 3. INITIAL DOSAGE GUIDELINES FOR OPIOID ANALGESICS.*

DRUG	EQUIANALGESIC DOSES		USUAL STARTING INTRAVENOUS OR SUBCUTANEOUS DOSES AND INTERVALS		PARENTERAL:ORAL DOSE RATIO	USUAL STARTING ORAL DOSES AND INTERVALS	
	PARENTERAL	ORAL	CHILD <50 kg	CHILD ≥50 kg		CHILD <50 kg	CHILD ≥50 kg
Codeine	120 mg	200 mg	NR	NR	1:2	0.5–1.0 mg/kg every 3–4 hr	30–60 mg every 3–4 hr
Morphine	10 mg	30 mg (long-term) 60 mg (single dose)	Bolus: 0.1 mg/kg every 2–4 hr Infusion: 0.03 mg/kg/hr	Bolus: 5–8 mg every 2–4 hr Infusion: 1.5 mg/hr	1:3 (long-term) 1:6 (single dose)	Immediate release: 0.3 mg/kg every 3–4 hr Sustained release: 20–35 kg: 10–15 mg every 8–12 hr 35–50 kg: 15–30 mg every 8–12 hr	Immediate release: 15–20 mg every 3–4 hr Sustained release: 30–45 mg every 8–12 hr
Oxycodone	NA	15–20 mg	NA	NA	NA	0.1–0.2 mg/kg every 3–4 hr	5–10 mg every 3–4 hr
Methadone†	10 mg	10–20 mg	0.1 mg/kg every 4–8 hr	5–8 mg every 4–8 hr	1:2	0.1–0.2 mg/kg every 4–8 hr	5–10 mg every 4–8 hr
Fentanyl	100 µg (0.1 mg)	NA	Bolus: 0.5–1.0 µg/kg every 1–2 hr Infusion: 0.5–2.0 µg/kg/hr	Bolus: 25–50 µg every 1–2 hr Infusion: 25–100 µg/hr	NA	NA	NA
Hydromorphone	1.5–2 mg	6–8 mg	Bolus: 0.02 mg every 2–4 hr Infusion: 0.006 mg/kg/hr	Bolus: 1 mg every 2–4 hr Infusion: 0.3 mg/hr	1:4	0.04–0.08 mg/kg every 3–4 hr	2–4 mg every 3–4 hr
Meperidine (pethidine)‡	75–100 mg	300 mg	Bolus: 0.8–1.0 mg/kg every 2–3 hr	Bolus: 50–75 mg every 2–3 hr	1:4	2–3 mg/kg every 3–4 hr	100–150 mg every 3–4 hr

*Doses are for patients over six months of age. In infants under six months, initial per-kilogram doses should begin at roughly 25 percent of the per-kilogram doses recommended here. Higher doses are often required for patients receiving mechanical ventilation. All doses are approximate and should be adjusted according to clinical circumstances. Recommendations are adapted from previous summary tables, including those of a consensus statement from the World Health Organization and the International Association for the Study of Pain.⁴⁹ NA denotes not applicable, and NR not recommended.

†Methadone requires additional vigilance because it can accumulate and produce delayed sedation. If sedation occurs, doses should be withheld until sedation resolves. Thereafter, doses should be substantially reduced, the interval between doses should be extended to 8 to 12 hours, or both.

‡The use of meperidine should generally be avoided if other opioids are available, especially with long-term use, because its metabolite can cause seizures.