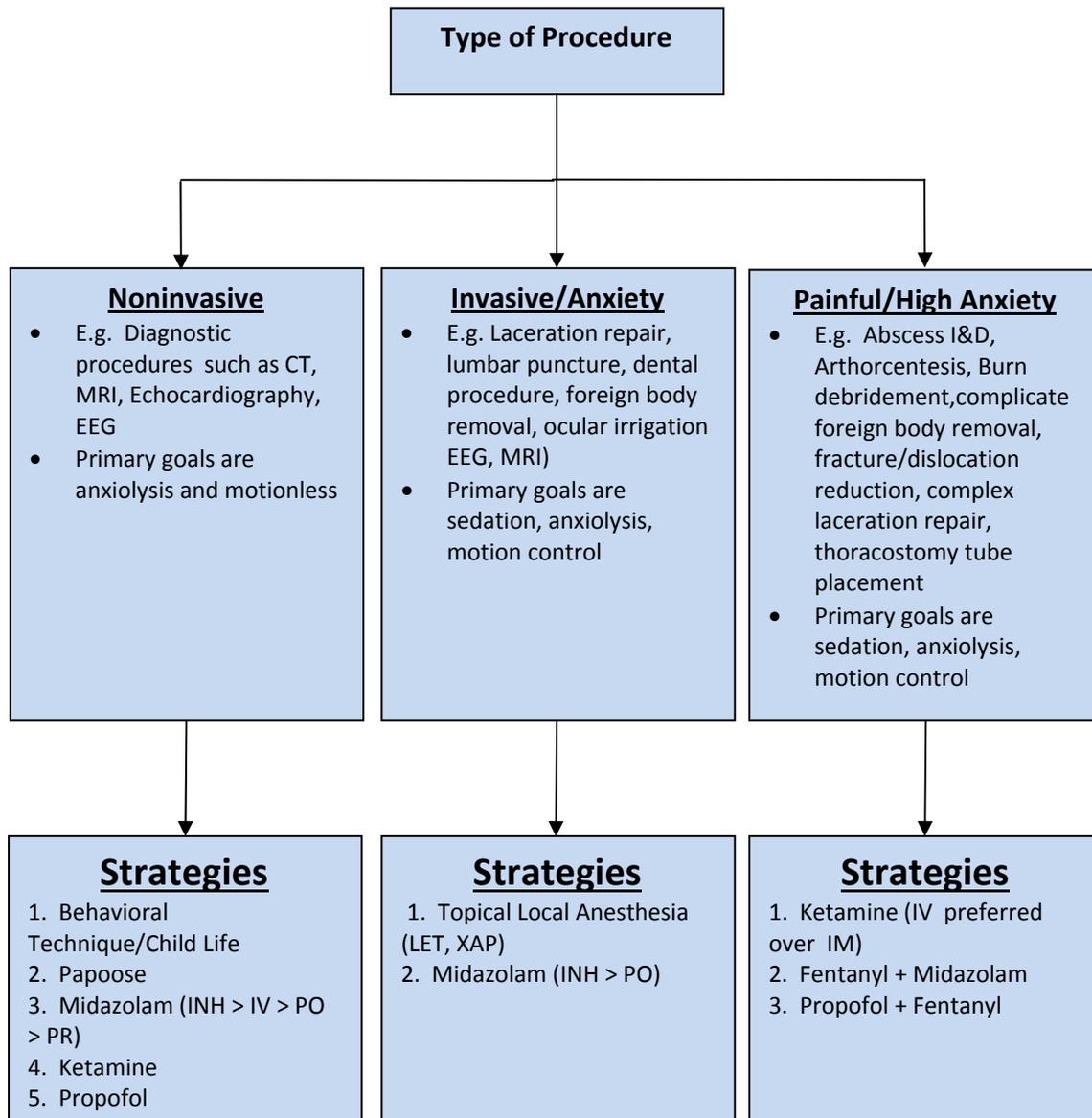


# Pediatric Procedural Sedation and Analgesia



*This guideline was ratified by the emergency department faculty at Maine Medical Center in April 2014. It reflects our expert opinion and is not necessarily applicable to all institutions. It is intended to be a reference for clinicians caring for patients and is not intended to replace providers' clinical judgment.*

## Pediatric Procedural Sedation and Analgesia Medications

| Drug          | Pediatric Dose   | Onset                                     | Duration                               | Comments/Contraindications  |
|---------------|--|---|--|---|
| Midazolam     | <p>IV: 0.05-0.1 mg/kg IV 3 min before procedure; not to exceed a total cumulative dose of 0.4 mg/kg or 6 mg</p> <p>IM: 0.1-0.2 mg/kg IM 30-45 min before procedure</p> <p>ORAL: 250-1000 mcg/kg PO X 1 approximately 30-45 min before procedure (Max of 20 mg)</p> <p>IN: 0.2-0.5 mg/kg/dose inhaled intranasally 10 min before procedure (may repeat ½ - 1 full dose x 1 10-15 min later to achieve desired level of sedation)</p> <p>R: 0.3-0.5 mg/kg/dose PR 30-45 min before procedure</p> | <p>1-2 min (IV)</p> <p>15 min (IM/PO)</p> | 30-60 mg IV                            | <ul style="list-style-type: none"> <li>Dilute PO dosing in juice</li> <li>For IN dosing, load syringe with appropriate volume and attach nasal atomizer; briskly compress the syringe to administer ½ the volume as atomized spray; repeat in other nostril so full dose is administered; max of 1 mL per nostril per atomization</li> <li>Temporary burning sensation in nostrils (usually 30-45 seconds)</li> </ul> |
| Pentobarbital | <p>IV: 1-2 mg/kg/dose IV; if needed may repeat dose; not to exceed a cumulative dose of 6 mg/kg or 150-200 mg</p> <p>IM: 1-6 mg/kg IM; not to exceed 100 mg/dose</p>   | 3-5 min IV                                | 30-40 min                              | <ul style="list-style-type: none"> <li>Short-acting barbiturate</li> <li>Excellent hypnosis</li> <li>Good agent for diagnostic procedures</li> <li>No reversal agent</li> <li>Patient requires PSA monitoring standards</li> <li>Burns on administration, dilute with Normal Saline to lessen this effect</li> </ul>  |
| Fentanyl      | 1 mcg/kg/dose IV; if needed, may repeat by 1-mcg/kg increments; not to exceed total cumulative dose of 4 mcg/kg  | 1-2 min                                   | 30-60 min                              | <ul style="list-style-type: none"> <li>Provides analgesia for painful procedures; increased risk of respiratory depression when combined with sedatives (reduce sedative dose); chest wall rigidity associated with rapid IV push</li> </ul>  |
| Ketamine      | Intravenous: 1-2 mg/kg loading dose IV; 0.25-1 mg/kg IV q10-15min; administer slowly, not to exceed 0.5 mg/kg/min  | <p>1 min IV</p> <p>3-4 min IM</p>         | <p>5-10 min IV</p> <p>12-25 min IM</p> | <ul style="list-style-type: none"> <li>Provides excellent sedation and analgesia; elicits dissociative state; increases bronchial and salivary secretions; increases heart rate, blood pressure, and</li> </ul>   |

|          |  |         |            |   |
|----------|--|---------|------------|---|
|          | Intramuscular: 4-5 mg/kg/dose IM   |         |            | <p>intracranial pressure; emergence hallucinations observed in older children (&gt;15 years) and adults; pharmacologic effects NOT reversible</p> <ul style="list-style-type: none"> <li>• <b>Adjuvant administration of Midazolam or Atropine not routinely indicated</b></li> <li>• <b>Relative Contraindications: &lt; 3 mo, Airway procedures, URI, Tracheal Stenosis, CV disease, Psychosis, CNS tumor, Suspected globe injury, poorly controlled asthma, uncontrolled hypertension</b></li> </ul> |
| Propofol | Data limited: 1-1.5 mg/kg IV loading dose; 0.25-0.5 mg/kg IV q3-5min or 50-150 mcg/kg/min continuous IV infusion | < 1 min | 3 – 10 min | <ul style="list-style-type: none"> <li>• Provides rapid anesthesia; apnea occurs upon induction and unpredictably causes loss of airway reflexes (even at sedative doses); irritation and burning with IV administration; effect NOT reversible</li> <li>• <b>Contraindications: Egg/soy allergy</b></li> </ul>   |

### Reversal Agents

| Drug       | Mechanism                 | Adult Dose  | Pediatric dose                         | Onset                           | Duration         | Comments  |
|------------|---------------------------|---|--|---------------------------------|------------------|---|
| Naloxone   | Opiate antagonist         | 0.4-2 mg IV/IM/SC/ET<br><br>Repeat q 2-3 min prn            | 0.01 mg/kg IV x1                       | 1-2 min IV<br><br>2-5 min IM/SC | 1-4 hour         | <ul style="list-style-type: none"> <li>• May precipitate acute withdrawal state in opioid dependent patients</li> </ul>   |
| Flumazenil | Benzodiazepine antagonist | 0.1 to 0.2 mg IV every 1 to 2 minutes to the desired effect | 0.02 mg/kg to a maximum dose of 0.2 mg | 1-2 min IV                      | Half life 50 min | <ul style="list-style-type: none"> <li>• Use with extreme caution in patients with benzodiazepine dependence or history of seizures as it may precipitate seizures</li> </ul> |

## **Unique Characteristics of Pediatric Procedural Sedation and Analgesia**

Children are at an increased risk compared to adults of suffering complications due to PSA for several reasons:

1. Infants and young children are more likely to have airway obstruction during sedation due to a relatively larger tongue, epiglottis and occiput.
2. Patients should be evaluated for tonsillar hypertrophy and its resultant obstructive sleep apnea, because patients with these problems are more likely to obstruct with milder forms of sedation and should receive less sedation/analgesia.
3. Due to their higher metabolic rates, compliant chest walls and tendency towards early fatigue, children desaturate more quickly after apnea than even moderately ill adults
4. Children require more frequent sedation dosing and their sedation level is more difficult to assess.
5. It is essential that drug dosages be calculated based on a precise weight measurement, not a parent's estimate.
6. Resuscitation equipment must be size and age appropriate.