Use this card to improve the safety and effectiveness of pain management in neonates, infants and children. These recommendations may not be appropriate for chronic (primary) pain.

**Department of Pain Medicine, Palliative Care and Integrative Medicine • 612-813-7888**

### Non-opioids commonly used for mild to moderate pain

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Pediatric dose</th>
<th>Max. dose</th>
<th>Dosing interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ibuprofen</td>
<td>PO</td>
<td>5–10 mg/kg</td>
<td>400–600 mg</td>
<td>6–8 hrs</td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>PO, PR</td>
<td>10–15 mg/kg</td>
<td>Do not exceed 5 doses in 24 hours or 4 grams per day</td>
<td>4–6 hrs</td>
</tr>
<tr>
<td>Acetaminophen*</td>
<td>IV</td>
<td>1–2 years = 10 mg/kg/dose &gt;2 years = 15 mg/kg/dose &gt;50 kg = 650–1,000 mg</td>
<td>&lt;50 kg = 15 mg/kg/dose &gt;50 kg = 1,000 mg/dose or 4 gm/day</td>
<td>6 hrs</td>
</tr>
<tr>
<td>Ketorolac**</td>
<td>IV</td>
<td>&lt;2 yrs = 0.25 mg/kg &gt;2 yrs = 0.5 mg/kg</td>
<td>30 mg</td>
<td>6–8 hrs</td>
</tr>
<tr>
<td>Celecoxib***</td>
<td>PO</td>
<td>10–25 kg = 50 mg &gt;25 kg = 100 mg</td>
<td>50 mg</td>
<td>12–24 hrs</td>
</tr>
</tbody>
</table>

*ONLY if rectal or oral administration contraindicated; reevaluate daily

**Recommend dosing no longer than five days

***If classical NSAIDs contraindicated; safety and efficacy is not established in children less than 2 years of age

### Opioid analgesics commonly used for mild to moderate pain (term infants and older)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Initial pediatric dose</th>
<th>Max. dose</th>
<th>Dosing interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tramadol*</td>
<td>PO</td>
<td>1–2 mg/kg</td>
<td>50–100 mg</td>
<td>4–6 hrs</td>
</tr>
</tbody>
</table>

* Tramadol has a ceiling effect. If using >8 mg/kg/day change to strong opioid. If pain persists or increases, discontinue and change to strong opioids. Do not combine Tramadol with strong opioids. See 2017 FDA recommendations; benefits may outweigh risks.

### Medications NOT recommended:

- Codeine can not be recommended — up to 34 percent of children gain no analgesic effect due to poor (CYP 2D6) metabolism; on the other hand, ultra-rapid metabolizers produce dangerously high morphine levels.
- Acetaminophen combination products (e.g., Tylenol #3, Vicodin [hydrocodone], Percocet [oxycodone]) are not recommended as dosing cannot be increased with increasing pain without risking associated liver toxicity of high doses of acetaminophen.

### Opioid analgesics commonly used for moderate to severe pain (term infants and older)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Initial pediatric dose</th>
<th>Initial adult dose</th>
<th>Dosing interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine</td>
<td>IV, SC</td>
<td>0.05–0.1 mg/kg</td>
<td>5–10 mg</td>
<td>2–4 hrs</td>
</tr>
<tr>
<td></td>
<td>PO/SL, PR</td>
<td>0.15–0.3 mg/kg</td>
<td>10–15 mg</td>
<td></td>
</tr>
<tr>
<td>Morphine: patient/nurse controlled analgesia (PCA)</td>
<td>Basal infusion: 0.015 mg/kg/hr PCA dose: 0.015 mg/kg *recommend basal infusion=PCA dose</td>
<td>Lockout interval = 5–10 minutes</td>
<td>1 hr max. limit = 4–6 PCA boluses/hr (e.g., 0.1 mg/kg)</td>
<td></td>
</tr>
<tr>
<td>Hydromorphone (Dilaudid)</td>
<td>PO/SL</td>
<td>0.05 mg/kg</td>
<td>1–2 mg</td>
<td>3–4 hrs</td>
</tr>
<tr>
<td>Hydromorphone (Dilaudid)</td>
<td>IV</td>
<td>Bolus: 15 mcg/kg Continuous infusion: 2–5 mcg/kg/hr</td>
<td>200–600 mcg 100–250 mcg/hr</td>
<td>2–4 hrs (bolus)</td>
</tr>
<tr>
<td>Oxycodone</td>
<td>PO/SL</td>
<td>0.1–0.2 mg/kg</td>
<td>5–10 mg</td>
<td>4–6 hrs</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>IV</td>
<td>Bolus: 1 mcg/kg Continuous infusion: 1 mcg/kg/hr</td>
<td>25–75 mcg 50 mcg/hr</td>
<td>10 min–1 hr (bolus)</td>
</tr>
</tbody>
</table>

### Opioid antagonist and side effect management

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Initial dose</th>
<th>Clinical indication</th>
<th>Dosing interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low dose Naloxone infusion</td>
<td>IV</td>
<td>0.5–2 mcg/kg/hr</td>
<td>Mild–moderate opioid induced side effects such as pruritus, nausea, etc. (Moderate to severe: opioid rotation)</td>
<td></td>
</tr>
<tr>
<td>Naloxone</td>
<td>IV, SC</td>
<td>1–5 mcg/kg 10 mcg/kg</td>
<td>*Reverse opioid-induced depressed respiratory rate Reverse opioid-induced apnea and coma; titrate to effect</td>
<td>2–3 mins</td>
</tr>
</tbody>
</table>

* Consider Naloxone for oversedation only; if conservative measures (e.g., tactile stimulation) show no effect.
4. Distraction and integrative therapies

- Consider use of nitrous oxide for minimal sedation for needle phobia
- For short procedures (chest tube removal), consider using short

5. Other pharmacological approaches

- For short procedures (chest tube removal), consider using short acting opioid (e.g., intranasal fentanyl 1.4 mcg/kg/dose)
- Consider use of nitrous oxide for minimal sedation for needle phobia or significant anxiety

**Procedural pain**
(e.g., for venipuncture, lab draws, suturing, dressing changes)

1. **“Numb” the skin: topical local anesthetics**
   - **Should always be offered**! (Teenagers may decline)
   - **Choice of topical anesthetic depends on clinical scenario** (ease of administration, cost, feasibility)—one of the following:
     - EMLA Cream (lidocaine 2.5% and prilocaine 2.5%) [at least 60 min]
     - 4% Lidocaine Topical Anesthetic Cream [at least 30 min]
     - J-tip (needleless lidocaine injector) [works in 1–3 minutes]
     - LET gel (for suturing): lidocaine 4%, epinephrine 0.18%, tetracaine 0.5% [30–45 minutes]

2. **Sucrose or breastfeeding for children 0–12 months**
   - Reduces pain and cry during painful procedure
   - Effective dose (24%): 0.05–0.5 mL (= 0.012–0.12 g)
   - Administer 2 minutes prior to procedure, lasts about 4 minutes
   - Breastfeeding should begin 2–5 minutes prior to procedure and continue throughout

3. **Comfort positioning**
   - Infants <6 months: keep warm, swaddle and use facilitated tucking or skin to skin contact
   - Upright positioning will increase sense of support and decrease pain and anxiety, suggest comfort positions (e.g., sit on parent lap, chest to chest hugging)
   - When feasible, offer choice to child (parent’s lap?)
   - Encourage parent to hold or be close
   - Child should NOT be held down by adults

4. **Distraction and integrative therapies**
   - Identify modalities based on age and development: positioning, diaphragmatic breathing, distraction, imagery, hypnosis, books, bubbles and pinwheels; video games; tablet/smartphone “Apps”, “Buzzy Bee”
   - At time of injection, offer to rub or stroke skin near injection site
   - Parent coaching: Nonprocedural talk, suggestions on how to cope, humor decrease children’s distress and pain
   - Include child life specialist or assign parent/nurse as “comfort coach”

5. **Other pharmacological approaches**
   - For short procedures (chest tube removal), consider using short acting opioid (e.g., intranasal fentanyl 1.4 mcg/kg/dose)
   - Consider use of nitrous oxide for minimal sedation for needle phobia or significant anxiety

**Analgesia for neonates and infants ages 0–6 months**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Pediatric dose (age)</th>
<th>Max. dose</th>
<th>Dosing interval</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acetaminophen</strong></td>
<td>PO, PR</td>
<td>5–10 mg/kg (0–30 days)</td>
<td>20–40 mg/kg/day</td>
<td>4–6 hrs (max. 4 doses/day)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 mg/kg (1–3 mos)</td>
<td>40 mg/kg/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10–15 mg/kg (3–6 mos)</td>
<td>40–60 mg/kg/day</td>
<td></td>
</tr>
<tr>
<td><strong>Acetaminophen</strong></td>
<td>IV</td>
<td>&lt;10 kg = 7.5 mg/kg</td>
<td>30 mg/kg/day</td>
<td>6 hrs</td>
</tr>
<tr>
<td><strong>Ibuprofen</strong></td>
<td>PO</td>
<td>4–10 mg/kg (3–6 mos)</td>
<td>40 mg/kg/day</td>
<td>6–8 hrs</td>
</tr>
<tr>
<td><strong>Morphine</strong></td>
<td>PO/PR/SL</td>
<td>0.075–0.15 mg (0–30 days)</td>
<td>0.08–0.2 mg (1–12 mos)</td>
<td>6 hrs</td>
</tr>
<tr>
<td><strong>Morphine</strong></td>
<td>IV/SC</td>
<td>0.025–0.05 mg (0–30 days)</td>
<td>0.1 mg/kg (1–6 mos)</td>
<td>6 hrs</td>
</tr>
<tr>
<td><strong>Fentanyl</strong></td>
<td>IV/SC</td>
<td>Infusion (with PCA bolus of same dose):</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oxycodone</strong></td>
<td>PO/SL</td>
<td>0.05–0.1 mg/kg (1–6 mos)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Only if rectal or oral administration contraindicated; reevaluate daily

**Avoid medication errors while prescribing**

**Write comprehensive orders, avoid abbreviations.**
- Spell out micrograms to avoid a transcription error.
- Spell out morphine, to avoid medication error when writing “ms.”
- Per kg dosing maximum = 50 kg (>50 kg = adult dosing)

**Avoid decimal errors:**
- Write “0.1” not “.1” / Write “11” not “1.0”. These can cause 10-fold dosing errors.
- NEVER prescribe volume [mL], ALWAYS prescribe dose [mg or mcg]

**WHO Principles of Pediatric Pain Management**

1. Apply the WHO-pain ladder: Do NOT undermedicate; advance to opioids if pain control suboptimal
2. Use around the clock medications for predictable pain PLUS additional breakthrough doses (NOT just prn pain medication)
3. Use the simplest and least invasive routes whenever possible (e.g., oral vs. IV, NEVER IM)
4. Assess the pain regularly and change your plan accordingly
5. Always integrate non-drug strategies in combination with medications to enhance pain control (e.g., cuddling, distraction, relaxation techniques, massage, hypnosis, aromatherapy)

**Multi-modal analgesia**
In complex pain situations opioids alone might not be sufficient. Effective opioid-sparing analgesia includes some or all of:
- Acetaminophen and/or NSAID/Cox-2 inhibitor
- Opioids
- Anesthetic intervention (nerve block, epidural infusion, etc.)
- Adjuvant analgesia
- Physical therapy, sleep hygiene
- Psychology, child life

**Denying Pain**
When a child denies or minimizes pain, consider possibility that the child:
- was previously treated for pain with injections or painful procedures
- has been encouraged to be “brave”
- lacks understanding that the pain can be treated
- lacks understanding regarding the words being used to ask about pain
- is afraid of medication side effects or addiction
- is worried that if still in pain, they will not be discharged as planned
- believes that tubes (such as NG) won’t come out until pain medications are stopped

If you have questions about medications or pain management, please call the Pain and Palliative Care Team 24/7 at 651-220-5400.