Principles of Pediatric Pain Management

Daniel P. Mahoney, MD
Assistant Professor, Pediatric Palliative Care
Le Bonheur Children’s Hospital
Surgery Grand Rounds
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Objectives:

● Briefly review physiology of acute pain
● Address attitudes about treating pediatric pain
● Teach skills to thoroughly assess and treat pediatric pain
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PHYSIOLOGY
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Acute Pain:

- “An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.”

International Association for the Study of Pain Guidelines, Merskey & Bogduk, 1994
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Nociception:\n
- Helps protect the body from potential or ongoing harm
- Descending control systems
  - Modulated by endogenous opioids, 5-HT, NE
- Nociceptive vs Neuropathic Pain
Attitudes
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Two Common Attitudes of Pediatric Pain Management:

- Kids are resilient, a little bit of pain isn’t going to hurt them.
- Opioids are not good medications to give to children.
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Primum Non Nocere:

- Failure to treat a child’s pain violates the first rule of medicine.
  - Inadequate analgesia for initial procedures in young children diminishes effect of adequate analgesia in subsequent procedures\(^3\)
  - Treatment of pain in children with burn injuries correlated with less severe PTSD\(^4,5\)
Primum Non Nocere:

- Failure to treat a child’s pain harms the patient-physician relationship.
  - Parents expect pain to be relieved\(^6\)
  - Pain control 2nd highest parental priority after correct diagnosis\(^7\)
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Primum Non Nocere:

- Failure to treat a child’s pain harms the patient-physician relationship (ctd).
  - Parents want to protect their children from pain
  - Parents assume that everything possible is done
Primum Non Nocere:

- Failure to treat a child’s pain harms the patient-physician relationship (ctd)
  - Iatrogenic pseudo-addiction\textsuperscript{10}
  - Lack of trust in providers to adequately treat pain\textsuperscript{11}
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Primum Non Nocere:

- Failure to treat a child’s pain is a potential public health threat and an economic liability.
  - Up to 25% of adults have a fear of needles that developed in childhood\textsuperscript{12}
  - Untreated chronic pain is costly to society\textsuperscript{13}
Opioid Attitudes and Myths:

- The child will become addicted to drugs
  - Pseudo-addiction$^{14}$
  - Properly maintained short term opioid use for acute pain has not been shown to lead to addiction in children$^{15}$
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Opioid Attitudes and Myths:

● The child will become over-sedated
  ○ Goal of opioid use is to provide analgesia without euphoria or sedation
  ○ Good monitoring of patient leads to analgesia without over-sedation
Opioid Attitudes and Myths:

- Opioid medications are “too strong” for the child’s pain
  - Strong pain needs a strong pain plan
  - Opioids are the best strong pharmacologic analgesic we regularly use
Opioid Attitudes and Myths:

- Opioids will give the child too many side effects
- Giving the child opioids will mask signs and symptoms\textsuperscript{16}
  
  ○ Review of adults and children showed no significant increase in management errors when patient given opioid prior to examination by surgeon\textsuperscript{17}
Opioid Attitudes and Myths:

- Children (and/or babies) don’t feel pain anyway
  - Jeffrey Lawson, 1985
  - 1987: Lancet article “Randomized trial of fentanyl anesthesia in preterm babies undergoing surgery: effects on stress response” by Anand KJS
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ASSESSMENT
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How do we assess pain?

- Measuring pain intensity
  - “Measuring pain by its intensity alone is like describing music only in terms of its loudness.” -Carl von Baeyer, MD

- Reasons for differences between stated pain rating and observed behavior
  - Anchors, patient doesn’t understand scale, social influences
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Anchors:

- Let’s go to the gym
- How do you describe the maximum amount of pain?
- Use of simple anchors (very much pain, hurts worst, most pain) avoids child having to suppose how painful a given scenario might be.
Patient doesn’t understand scale:

- Is the scale developmentally/age-appropriate?
  - Faces (4yo), VAS (6-7yo), NRS (8+yo)
  - For 3-5yo, limit their options to the same number as their age

- Was the child trained how to use the scale when they were NOT in pain?

von Baeyer, 2003
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Social Influences:

● What (good) reasons do kids have for not telling the truth?

● What effect does modeling have on reported pain score?

● Pain is experienced, expressed (encoded), interpreted by another (decoded), all before it can be treated.\(^{18}\)
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So, how did you do?
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TREATMENT
2012 WHO Guidelines:

- By the clock
- By the child
- By the appropriate route
- By the ladder
By the clock:

- When a child is having persistent pain, pharmacologic analgesia should be scheduled.
- This allows drugs to reach stable levels in the blood.
- PRN = Patient Receives Nothing.
By the clock:

- PRN dosing may take longer amount of time to manage pain
  - Results in cycle of undermedication and pain alternating with overmedication and side effects or toxicity\textsuperscript{19}
  - 69\% of hospitalized pediatric patients for whom pharmacologic analgesia was ordered didn’t receive a single dose\textsuperscript{20}
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By the child:

- Treatment should be tailored to the individual child
  - Different children may respond differently to same dose
  - Reassess frequently to look for signs of oversedation or side effects
  - At analgesic opioid dosing, no or minimal sedation expected
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By the child:

- “Autonomic stress” response not correlated with pain intensity in post-operative patients\(^{21}\)
- Use of objective autonomic or respiratory data cannot replace traditional thorough pain assessment\(^{22}\)
- Absence of tachycardia, tachypnea, hypertension does not mean that the child has no pain
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By the route:

- PO, IV, PR, SQ, SL, IN, TD, IM

Which route works best?

- Whichever is LEAST noxious and MOST efficient
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By the ladder:

- **Step 1: Mild Pain**
  - Acetaminophen and/or Ibuprofen
  - Possibly other NSAIDs?
  - Basic non-pharmacologic pain management

- **Step 2: Moderate to Severe Pain**
  - Incorporate Step 1
  - Add Opioid Medications
Acetaminophen:

- Great, safe option for mild acute pain
- FDA recommends no more than 3g/day
- Combination medications can lead to overdose!
Ibuprofen:

- Great, pretty safe option for mild to moderate acute pain
- No significant difference in incidence of post-operative hemorrhage between acetaminophen or ibuprofen\(^{23}\)
- Ibuprofen and Ketorolac appear to have equivalent analgesic effect\(^{24}\)
Ketorolac:

- Good short-term IV NSAID
- Mechanism - reversible inhibition of COX-1 and COX-2
- 30mg IV provides analgesia comparable to 12mg PO morphine$^{25}$
Morphine:

- Gold Standard Opioid, Mu receptor agonist
- Peak analgesic effect
  - PO: ~60 min
  - IV: 10-20 min\(^{26}\)
- Duration of analgesia ~4 hours, less in younger children
Hydromorphone:

- No significant difference in analgesia or side effect profile compared to morphine\textsuperscript{27}

- Peak analgesic effect\textsuperscript{28}
  - PO: \(~60\) min
  - IV: 10-20 min
Opioid Use in Pediatrics

Oxycodone:

- Oral dosing, lasts longer than morphine
- Infants <6mo can’t metabolize as fast - adjust dosing\(^{29}\)
- Recommended starting doses are NOT ceiling doses
Conclusions:

- Primum Non Nocere
- PRN = Patient Receives Nothing
- Anchors Away
- Opioids: The sky is the limit
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