



EM CASES SUMMARY

Episode 67 – Pediatric Pain Management

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Why is Pediatric Pain Management Important?

Short-term detrimental effects of painful procedures

1. Extended procedure duration and length of stay
2. Slower surgical healing
3. Emotional trauma and suffering

Long-term detrimental effects of painful procedures

1. Infant pain may actually change pain processing
2. Avoidance/heightened sensitivity to medical care
3. Fear/increased pain experienced healthcare evaluation

Pediatric Pain Assessment Tools

A) Infants

FLACC Scale (out of a total score of 10)

Categories	0	1	2
Face expression	No special expression	Slight frowning, grimace	Mop, teeth clenching
Legs	Normal position	Tight, stressful	Kick at anybody
Activity	Calm	Turn around	Hop off, jerk
Cry	No cry	Groan, moaning	Shouting cry, with screams
Consolability	Relaxed	Consoled with hug or touch	Never consoled

FLACC=Face, leg, activity, cry, consolability

B) 4-8 years old

Faces Pain Scale Revised (child points to face that best describes their pain)



C) 8-15 years old
Visual Analog Scale



0 1 2 3 4 5 6 7 8 9 10

Do vital signs help in Pediatric Pain Assessment?

There is no correlation between improvement in pain scores and changes in heart rate, respiratory rate or blood pressure. Using vital signs to assess pain in children may be misleading.

Triage-Initiated Pain Protocols

A nurse-driven protocol at triage has been shown to improve time-to-analgesia. Many Canadian hospitals employ oral acetaminophen or ibuprofen triage-initiated pain protocols, and some in Canada and Australia employ intranasal fentanyl and oral opioids.

Low Resource Utilization Distraction Techniques

Infants

1. Breastfeeding or breast milk has been shown to temper pain but has not been established for repeated painful procedures
2. Oral Sucrose (2mL) reduces signs of distress in infants when given 2 minutes before the procedure and the analgesic effect can be augmented with non-nutritive sucking via a pacifier. If oral sucrose is not available, D25W 2mL is a reasonable replacement.
3. An infant warmer or warm blanket

Toddlers and Older Children

1. **Music** has been shown to minimize the pain and anxiety associated with painful procedures in children. Simply using a parents smartphone or tablet device to play a child's favorite music is a low-cost simple distraction technique.
2. **Guided Visual Imagery** may be of particular benefit to children as they are generally accepting of the idea of fantasy and suggestion. The dissociative effects of Ketamine in particular make it an ideal agent for the adjunctive use of guided imagery.

Topical Analgesic Options For Venipuncture

EMLA has an analgesic onset of 60 minutes after application and so is not recommended for wide use in the ED where a shorter onset is usually required.

Amethocaine 4% gel (Ametop) has been shown to be superior to EMLA for reducing overall needle insertion pain with less needle attempts required and the onset is faster (30 mins) than EMLA.

Liposomal Lidocaine 4% (LMX-4, Maxilene, ELA-Max) also has an onset of 30 mins and has been shown to be effective in pediatric patients for LP in particular.

Vapocolant spray has the advantage of immediate analgesic onset, however it is only suitable for procedures that are anticipated to require brief analgesia.

J-tip with buffered lidocaine (Zingo) is a needle-free injector with analgesic effect in 1-3mins. The J-tip eliminates the 'second poke' for venipuncture, decreases the risk of needle stick injury, and decreases the risk of infection transmission, however the evidence is weak (one study compared J-tip with buffered lidocaine to sham only and another compared it to an EMLA group, many of whom did not have the full 60 minutes of topical application)

Graded Analgesic Options for Pain Anticipated to Last Hours to Days

Mild-Moderate Pain:

Ibuprophen (10mg/kg q6h) has been shown in several studies to be superior to Acetaminophen (15mg/kg q4h) for mild-moderate musculo-skeletal pain in children. While the combination of Ibuprophen and Acetaminophen has been shown in adult studies to be superior to either one alone, this has not been adequately studied in children. Nonetheless, our experts do recommend using the combination of ibuprophen and acetaminophen in the ED. While outpatient use of this combination may lead to dosing errors and inadvertent overdose, it may be considered for children with reliable parents who have been counseled appropriately.

Moderate-Severe Pain:

Oral morphine suspension at 0.2-0.5mg/kg (max 15mg) with or without ibuprophen

Step-Wise Ladder Approach to Outpatient Pain Management

Low-Moderate: acetaminophen or ibuprophen or both

Moderate-Severe: oral morphine or oxycodone-acetaminophen - Roxacet suspension (available in United States)

Pain Severity	Agents of Choice
Mild pain	ibuprophen +/- acetaminophen
Moderate pain	ibuprophen +/- acetaminophen + morphine
Severe pain	ibuprophen +/- acetaminophen + morphine or oxycodone

Intravenous morphine is recommended by our experts for children with severe pain in whom you expect a prolonged period of pain of hours-days (eg: suspected appendicitis) at a dose of 0.1 mg/kg IV push with frequent reassessments and titration to adequate pain control every 10 minutes. An oxygen saturation monitor is recommended for children receiving multiple doses of morphine.

Codeine Should Almost Never be Given to Children or Breastfeeding Mothers

Codeine has a very wide bioavailability depending on the individual's metabolism. Some individuals are slow metabolizers, while others are rapid metabolizers, and so the effects of codeine are unpredictable. There have been numerous case reports of pediatric deaths related to the use of 'therapeutic' doses of codeine.

The story of Tariq & Rani Jamieson: Tariq was a breastfed healthy term infant who was born in Toronto in 2005. Rani, his mother, was prescribed Tylenol #3 for episiotomy pain, which was taken at 'therapeutic' doses. On Day 7 of life, Rani noticed that Tariq was lethargic and on Day 11 was seen by his primary care physician

for poor feeding. Rani had decreased her Tylenol #3 dose to 1 tablet twice daily. Nonetheless on Day 13 Tariq was found motionless and breathless in the family kitchen, and despite EMS attempts at resuscitation, was pronounced dead. The post-mortem examination discovered that Tariq had 7 times the acceptable morphine concentration (metabolite of Codeine) in his blood. Rani was phenotyped as an ultra-rapid metabolizer of Codeine, and the cause of death was determined to be Codeine overdose.

Analgesic Options for Pain Anticipated to Last Minutes or as A Bridge to Intravenous Analgesics

Nitrous Oxide

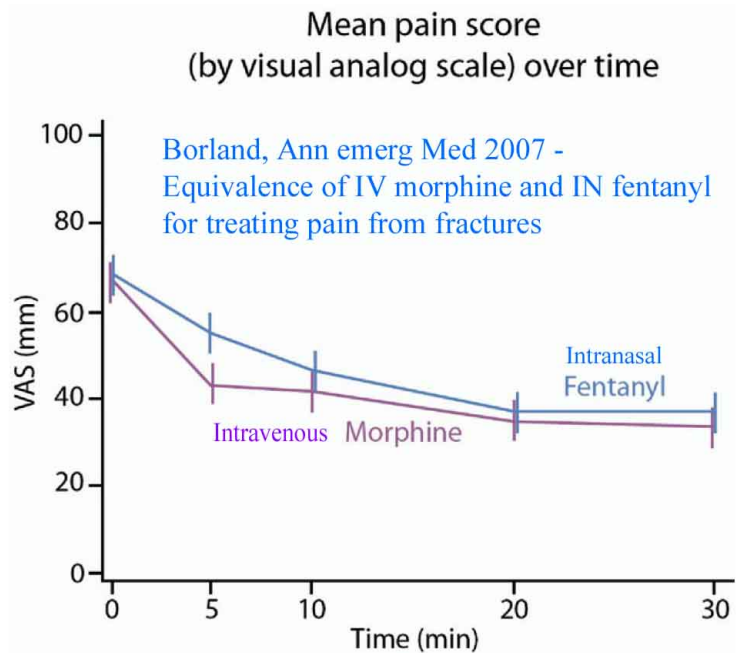
Nitrous Oxide is a relatively weak dissociative anesthetic gas with mild-moderate anxiolytic, analgesic and amnesic properties. It has a rapid onset of 5 minutes and recovery of 5-15 minutes. The rate of adverse events (vomiting, dizziness, euphoria/dysphoria) is low (0.03%) and most hospital protocols do not require fasting for its use.

Intranasal Analgesics & Anxiolytics

Intranasal Fentanyl (1-1.5mcg/kg IN) has comparable effects to IV Morphine (see graph), with a rapid onset and high bioavailability.

A general rule of thumb for dosing intranasal medications is to use twice the IV dose. Administer IN fentanyl using an atomizer in the

most concentrated available formulation, and if more than 0.3mL is required, consider splitting the dose and administering one half in one nare and the other half in the other nare so that the absorptive area is maximized. With appropriate doses, respiratory depression is rare and can be reversed with intranasal naloxone.



Intranasal Ketamine (1mg/kg IN) in children 3-13 years of age with isolated limb injury and moderate to severe pain was shown in the PITCHFORK study in 2015 to have similar pain reduction when compared to IN Fentanyl 1.5mcg/kg in a randomized controlled fashion. In this study 78% of children had minor adverse events with ketamine compared to 40% with fentanyl, however none suffered

moderate or severe adverse events.

Intranasal Midazolam is an effective anxiolytic in children however a significant proportion of children will suffer from **more** anxiety after receiving midazolam; therefore our experts do not recommend it as a first line anxiolytic.

Do Children Receiving Skin Adhesive for Laceration Repair Require Analgesia?

Lidocaine Epinephrine Tetracaine (LET) gel has been shown to decrease pain in children with lacerations that are treated with skin adhesive in an RCT. Some pediatric emergency departments have nurse-initiated LET application at triage for all children with lacerations, regardless of the method of laceration closure used.

Quote of the Month

Pain is inevitable. Suffering is optional.
-Dalai Lama

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