It’s Just a Poke, Right? Procedural Pain Management in Pediatrics

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Learning Objectives

* Appreciate incidence of procedural pain in children
* Review the evidence for importance of managing procedural pain
* Describe importance of the “non-negotiable” components of state-of-the-art procedural pain management: topical anesthesia, positioning, and distraction (& sucrose if <12 months)

Procedural Pain in Children

http://www.cartoonistgroup.com

What argument might colleagues voice against procedural pain strategies (such as topical anesthesia, positioning, integrative modalities such as bubble blowing) for all children?
Procedural Pain: A call for action

- What are children most afraid of coming to our clinical service?

- Needle procedures (incl. vaccine injections) performed in childhood are a substantial source of distress

- It is estimated that up to 25% of adults have a fear of needles


Pain Controlled (2005-2013)

- In past 24 hrs, what was cause of worst pain?
  * 40% Needle poke
  * 34% Trauma/injury/other medical
  * 10% Surgery
  * 8% Procedure
  * 4% Acute illness/infection
  * 3% Treatment for known disease

Procedural Pain: A call for action

Untreated pain can have long-term consequences including
- preprocedural anxiety
- hyperalgesia
- needle fears
- avoidance of health care (including nonadherence with vaccination schedules)


Procedural Pain in the Neonate

Critically ill infant may experience >480 painful procedures during NICU stay

Exposure to severe pain on NICU, without adequate treatment, has negative long-term consequences
- ↑ morbidity (hypoxia, coagulopathy, respiratory incoordination, increased intracranial pressure)
- ↑ risk of IVH
- ↑ mortality

Procedural pain: A call for action

Pain ratings at 4-6 months routine vaccination higher for circumcised versus uncircumcised boys

Preterm infants: Poorer cognition and motor function associated with higher number of skin-breaking procedures

Parents expect pain to be relieved

Parents’ greatest distress: failing to protect their child from pain

Memory of previous painful experience has great influence on pain experience during subsequent procedures
Procedural pain: A call for action


• Children (5-10 yrs) perceive their parents as worried, when they reassure (e.g. “it’s okay”) - whereas distraction is associated with increased child coping. McMurtry CM, Chambers CT, McGrath PJ, Asp E. When “don’t worry” communicates fear: Children's perceptions of parental reassurance and distraction during a painful medical procedure. Pain. 2010 Jul;150(1):52-8.

• Systematic review: Cross-cultural comparison - Pediatric medical procedures

“It is not rocket surgery”

Joey Tribbiani

Children’s Comfort Promise
Essential Components of Procedural Pain Management

“Non-Negotiable”
- Topical Anesthesia
- 0-12 months: Sucrose
- Positioning
- Distraction (Integrative (non-pharmacological) therapies)

Other Considerations
- Possibly other pharmacological approaches
- Consider appropriate sedation, if excellent analgesia cannot be achieved

“Non-negotiable” Components of Procedural Pain Management in Children

1. Numbing
   2. Sucrose
   3. Positioning
   4. Distraction

Topical Local Anesthetics


- Topical anesthetics are considered safe for children of all ages. However, administration of excessive doses and/or prolonged application times can lead to serious adverse effects, including irregular heartbeat, seizures and difficulty breathing. [www.hc-sc.gc.ca/dhp-mps/medeff/advisories-avis/public/_2009/emla_ame_top_pc-cp-eng.php](http://www.hc-sc.gc.ca/dhp-mps/medeff/advisories-avis/public/_2009/emla_ame_top_pc-cp-eng.php)

- For children undergoing vaccination, there is insufficient evidence for or against the use of skin-cooling techniques (vapocoolants, ice, cool/cold packs) to reduce pain at the time of injection (grade I recommendation, based on conflicting level I evidence).
EMLA versus LMX

- EMLA Cream (lidocaine 2.5% and prilocaine 2.5%) vs Ela-Max LMX 4% Lidocaine Topical Anesthetic Cream

- EMLA application for preventing pain during IV insertion in Children

- Analgesia duration:
  - EMLA 1-2 hours vs. LMX 1 hour

- Skin time:
  - EMLA 4 hours vs. LMX 2 hours

EMLA® and Neonates

- In neonates, EMLA reduces the behavioral pain response to venipuncture but not heel lance

- Effective for neonates > 34 weeks gestation for lumbar puncture

- Single doses have not been associated with methemoglobinemia

Application of Cream

- Cellophane (no Tegaderm®: hurts at time of removal)
Needle pokes without the pain?
J-Tip in the Emergency Room (CBS 4 Morning News)

J-Tip (Lidocaine)

*J-tip: single-use, disposable, carbon-dioxide-powered, needleless lidocaine injector

* Adults: More pain than s.c. lidocaine


Needle pokes without the pain?
J-Tips at Children’s of MN
**LET Anesthesia**

- 3mL LET-gel: Lidocaine 4% - Epinephrine 0.18% - Tetracaine 0.5%
- Sitting upright
- Distraction
- Topical Anesthesia

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**“Non-negotiable” Components of Procedural Pain Management in Children**

2. Sucrose

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**Sucrose for Children 0-12 months**

- Reduces pain (PIPP, VAS) and cry during painful procedure, such as venipuncture. Stevens B, Cochrane Database of Systematic Reviews 2004, Issue 3.
- Role of endogenous opioids - naloxone blunts effect
- Effective dose (24%): 0.05 - 0.5 mL (= 0.012 - 0.12 g)
- Administration 2 minutes prior to mild - moderately painful procedure
- Duration ~ 4 min

- Breastfeeding
  - Effective in term infants (superior to sweetening agents). Shah PS, Cochrane Database of Systematic Reviews 2006, Issue 3.
Integrative Therapies for Neonates

**Neonates**

**Nonpharmacologic, supportive measures:**

- **Breastfeeding** (Shah PS, Cochrane Database of Systematic Reviews 2006, Issue 3)
- **Sucrose** (Stevens B, Cochrane Database of Systematic Reviews 2004, Issue 3)
- **Nesting/Swaddling**
- **Kangaroo care** (Gray, Pediatrics 2000; Johnston APAM 2003)
- **Dimming light & noise**


Premature 28-36 wks: For heelstick - Kangaroo care more effective than oral glucose, which is more effective than placebo


Epub 2008
“Non-negotiable” Components of Procedural Pain Management in Children

3. Positioning

Pediatric Positioning in 1985
Positioning


• When feasible, offer choice to child (parent’s lap?)

Comfort Positions

• Children’s of Central California 2014

Swaddling, facilitated tucking, kangaroo care
“Non-negotiable” Components of Procedural Pain Management in Children

There is strong evidence that **distraction and hypnosis** are effective in reducing the pain and distress that children and adolescents experience during needle procedures.

- Promising but limited/no evidence for preparation and information or both, combined CBT, parent coaching plus distraction, suggestion, or virtual reality.

**Integrative Therapies for Needle Procedures**

Integrative Therapies for Needle Procedures


* Parent coaching: Certain types of parental behaviours (e.g., nonprocedural talk, suggestions on how to cope, humour) have been related to decreases in children’s distress and pain, whereas others (e.g., reassurance, apologies) have been related to increases in children’s distress and pain. Taddio A, Chambers CT, Halperin SA, et al. Inadequate pain management during childhood immunizations: the nerve of it. Clin Ther 2009;31(Suppl 2):S152-67.

**Distraction**

* Distraction involves taking the child's attention away from the procedure. It is effective for children of all ages.
1. Involve parents/caregivers and children in helping to select the lead-distraction strategies for the child and involve them in helping with distractions.
2. Choose an age-appropriate strategy based on the child's age and stage of development.
   - Telephone: toys, stuffed animals, music
   - School-aged children: games, video games
   - Adolescents: talk, favourite movies, music
4. Stay focused on the child and interact with the child throughout the procedure.
5. Provide verbal and physical reminders for the child to continue to pay attention to the distraction.
6. Re-direct the child's attention back to the distraction strategy if their attention wanders to the procedure.
7. Use a variety of distractions, and multi-sensory distractions, as necessary.
8. Maintain a positive attitude.
9. Praise the child for engaging in distraction behaviours.

**Deep Breathing**

* Prompt children 3 years and older to take slow deep breaths.
* Deep breaths can be facilitated by using bubbles or toys, which also act as distracting techniques.

**Simple Suggestion**

* DO NOT tell children that “it won’t hurt” because evidence shows that this is ineffective. It also promotes distress. Instead, tell children how you are going to help them.”

**Hypnosis in Pediatric Practice: Imaginative Medicine in Action**

By Laurence Sugarman, MD

A documentary for child health professionals
Distraction

- Reduction of fear and anxiety
- Determine if the child wishes to watch or be distracted
- Young children: books, bubbles and pinwheels
- Coaching roles for parents
- Older children: video games and biofeedback

How many mistakes can you spot?

“Non-negotiable” Components of Procedural Pain Management in Children

Other Considerations

(5) (Intranasal) Systemic Analgesia
(6) Sedation
Intranasal Opioid Application

* Nasal mucosa richly vascularized
* Fenestrated epithelium drains by way of the facial and sphenopalatine veins
  ⇒ Avoiding first pass metabolism

* Hydromorphone: ER trauma patients - plasma concentration similar to those after IV administration

Intranasal Opioid Application

* Drops or spray diluted in normal saline 0.9%
* Pharmacokinetic profile similar to i.v. in children
* Mucosal Atomization Device (MAD)

Intranasal Opioid Application

* RCT
* 24 children (4-8 years)
* Burn dressing changes
* Control: oral morphine
* Titrated until pain free
  ⇒ intranasal dose slightly higher (1.4 mcg/kg + 15mcg Q5min)
  ⇒ pain relief comparable
  ⇒ safety profile acceptable, no serious adverse events

Intranasal Opioid Application

- RCT
- 32 children (4-8 years)
- Postoperative analgesia
- Control: i.v. fentanyl
- Titrated until pain free
  ⇒ intranasal dose slightly higher (1.4 mcg/kg)
  ⇒ pain relief comparable
  ⇒ safety profile acceptable, no serious adverse events

- Case report
- Acute pain ER
- 48 children (3-12 years)
- Dose applied every 5 minutes as required
- Median dose: 1.5 mcg/kg
  ⇒ good pain control
  ⇒ no side effects

Sedation

If good procedural analgesia not feasible with the “4 Non-Negotiables”, consider:

(1) Mild sedation: Nitrous gas


or

(2) Moderate/deep sedation (e.g. ketamine, propofol)

Note:
A sedative alone (such as a benzodiazepine) can never be a substitute for procedural analgesia.

IV Access Under Nitrous Gas

22 months-old, LMX in place, needed IV for radiologic procedure, history of challenging IV access in the past

Thanks to Patricia D. Scherrer MD, Medical Director, Sedation Services Children's Hospitals and Clinics of Minnesota
Treatment protocol for painful procedures is expected standard of care in 21st century: Non-negotiable:

- Positioning, topical anesthesia, integrative therapies, sucrose
- Plus/minus sedation, systemic anesthesia

Conclusions Procedural Pain

Children’s Comfort Promise

We will do everything possible to prevent and treat pain
Further Training

Education in Palliative & End-of-life Care [EPEC]: Become an EPEC-Pediatrics Trainer | Chicago, IL, Oct 16-17, 2014

Center to Advance Palliative Care (CAPC) - Pediatric Palliative Care Leadership Center (PCLC) Training | Oct 22-24, 2014

8th Annual Pediatric Pain Master Class | Minneapolis, MN | June 20-26, 2015

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