Pain-free Dermatology: Minimizing Discomfort in Procedures for Children and Adults

Peter A. Lio, MD, FAAD
Assistant Professor Clinical Dermatology & Pediatrics
Northwestern University Feinberg School of Medicine

I have no relevant disclosures

Inspiration

• Pediatrics vs. Dermatology…

Trauma

• Me > Patient!

Minimizing Pain

• Everybody wins:
  – The patient has less pain
  – The parents have less stress
  – The dermatologist has a smoother procedure!

Outline

• The History and Science of Pain
• A Model for Ensuring Procedure Success
  – Pharmacologic
  – Non-pharmacologic
• Practical Take Home Points
Pain-free Dermatology: Minimizing Procedure Discomfort in Children and Adults
Alisa McQueen, MD, FAAP, FACEP
Associate Professor of Pediatrics
The University of Chicago
Comer Children’s Hospital

I have no relevant financial relationships to disclose.

Procedural Distress
- Pain
- Fear
- Attention

Procedure Strategy
- Pain
- Analgesia
- Fear
Definitions

“an unpleasant sensory and emotional experience associated with actual or potential tissue damage”

International Association of the Study of Pain

Nociception

• “perception of injury or painful stimuli by nerve endings, spinal tract, midbrain, and cortex and does not involve the affective or evaluative components of pain”

• Nociception + “OUCH” = PAIN
Pain Transmission Theory

- A delta fibers
  - 2-5 mm in diameter and myelinated
  - have a fast conduction velocity (5-40 meters/sec)
  - localized pain sensations, sharp pain
- C fibers
  - 0.4-1.2 mm in diameter and unmyelinated
  - slow conduction velocity (0.5-2.0 meters/sec)
  - transmit dull, poorly localized pain sensation
  - 70% of all nociceptive pain transmission


Skin-to-skin is analgesic


Breastfeeding is analgesic


“A sucker consisting of a sponge dipped in some sugar water will often suffice to calm a baby.”

Modern Surgical Technique, 1938

Sucrose is an effective analgesic in newborns for single, limited procedures

Sucrose likely works on opioid receptors

Optimal dose is unclear but 24% does the trick
(1 packet of table sugar to 10 cc sterile water)

Procedure Strategy

Topical Anesthetics
- There are many different topical anesthetics available
- Act via a "numbing effect": reversible block in nerve conduction for minutes to hours
- Very safe overall

Topical Anesthetics
- 1:1 mixture of 2.5% lidocaine and 2.5% prilocaine (EMLA: eutectic mixture of local anesthetics)
- They melt at a lower temperature than they do separately → a liquid at room temperature
- The combination is more effective than using both drugs together


Topical Anesthetics

• Applied about 60 minutes before the intended procedure, it penetrates up to a depth of 10 mm
• Penetration can be increased with occlusion
• Possible side effects: methemoglobinemia
  – Usually concern in < 3 months of age and when using large amounts (>2 g per 10 cm²)

Topical Anesthetics

• A review of 8 trials (n = 458 children) of painful procedures compared tetracaine to EMLA
• Both were comparable for pain relief with 60 min application for EMLA and 30 min for tetracaine

Topical Anesthetics

• Liposomal lidocaine is newer anesthetic
• Appears to have superior effect with faster onset (30 min)
• A trial of liposomal lidocaine vs. tetracaine found no significant difference in pain scores

Pearl

• Cryotherapy pain has both immediate and delayed component
• Applying a topical anesthetic (e.g., 4% lidocaine cream) right after freezing can render the lesion painless within 30 seconds!
• Theory: ice crystals during freezing damage epidermal barrier, thus increasing penetration

Local Anesthetics

• Injectable anesthetics are the mainstay of dermatologic procedures
• They are very safe, work rapidly, and are very cost effective
• There can be significant discomfort as they are injected, however, both from the needle and the infiltration

For the Needle Pain

• Consider a topical anesthetic first
• Dr. McQueen will talk about fantastic distraction techniques shortly
For the Infiltration Pain

- Warm lidocaine (37°C) is less painful than room temperature (21°C)
- Deep dermal injection is less painful than superficial wheal-producing injection
- Slow injection is less painful than rapid injection


For the Infiltration Pain

- pH of lidocaine solution is between 3.5-7.0
- The acidity is thought to be responsible for the pain
- Alkalization of the lidocaine can reduce this pain


Buffer

- A systematic review of 23 studies determined that pain from injection of buffered lidocaine was less than from unbuffered lidocaine
- Buffering is generally achieved by adding 1 mL of 8.4% sodium bicarbonate to 9 mL of 1% or 2% lidocaine


- Theoretical issues with adding sodium bicarbonate:
  - Causing precipitation
  - Decreasing potency
  - Reducing shelf life

- None of these found in the studies reviewed


Conclusion

- Use buffered, warm lidocaine and 30g needle. Inject the smallest amount slowly into the deep dermal tissue as the needle is being slowly withdrawn.


Next-level Pearl:

- "Saline kiss" (Dr. Melanie Palm): inject with normal saline first (bacteriostatic) to raise a wheal
- Then inject the buffered lidocaine
- This may work in part because the bacteriostatic ingredient (benzyl alcohol) is also an anesthetic!
- Benzyl alcohol reduces pain and prolongs the anesthesia

Cooling

- Cooling the skin may decrease nerve conduction velocity of C and A[delta] fibers, thus decreasing the transmittance of pain.
- A study of 60 subjects found no significant difference between buffered anesthetic and skin cooling in reducing pain of infiltration.
- Suggests that cooling could be as effective as the pharmacologic effect of buffering.

More Cooling...

- A study randomized 39 patients before injecting anesthesia to skin cooling (termed “cryo-preparation”) or no skin cooling.
- They found significant reduction in injection pain with cryo-preparation – 24.6% reduction in pain score that was statistically significant (p = 0.039).

Many Ways to Cool

- Evaporative refrigerant sprays such as ethyl chloride to a simple ice pack.
- One study compared ice cubes wrapped in latex or latex-like glove material to cubes wrapped in aluminum foil and found that the aluminum foil wrapping was more effective at reducing skin temperature before neurotoxin injection.
- After 120 seconds of exposure, only the aluminum foil wrap was able to achieve a 2°C skin temperature—thought to be necessary to reduce nerve conduction and increase the pain threshold.

Vibration

- A study of 20 neonates found application of vibration during heel stick reduced pain (measured by the Neonatal Infant Pain Scale).
- In adults, at least one study demonstrates vibration outperforming vapo coolant for pain reduction during venipuncture.

Vibration + Cooling

- Vibration + Cooling may be even more effective.
- Numerous studies demonstrate statistically and clinically significant reduction in pain perception when both are applied proximal to the painful procedure.
- A randomized prospective trial of 81 children who received standard therapy versus use of a device combining cooling and vibration lowered pain scores and improved venipuncture success.

Procedure Strategy

- Analgesia
- Anxiolysis
- Distraction
What about Parents?

Use verbal reassurance with caution, especially for kids under 6 years.

Instead of:

“I’m sorry.”

Try:

“You’re being very brave.”

Instead of:

“The medicine will burn.”

Try:

“Some kids say it feels warm, other kids say it feels tingly.”

Instead of:

“Tell me when you’re ready.”

Try:

“When I count to three, blow the feeling away from your body.”
Procedure Strategy

Can distraction out-perform drugs?

- 112 children age 4-12 undergoing elective surgery
- Anxiety assessment at admission and at induction
- Postoperative effects measured

Can distraction out-perform drugs?

- Parent presence alone (PPIA)
- Parent presence + video game (VG)
- Parent presence + midazolam (M)

Can distraction out-perform drugs?

Active vs Passive Distraction

- Children 3-16 years undergoing painful procedures
- Randomized to active distraction (tablet) or passive distraction (cartoon)
- CHEOPS and self report pain scale measured at baseline, during procedure, and recovery
Results: self-reported pain

![Chart showing pain levels over time with 'Distraction' and 'Baseline' categories with a note: p<0.01.]

Results: CHEOPS*

![Chart showing pain levels over time with 'Distraction' and 'Baseline' categories with a note: p=0.03.]

*Children's Hospital Eastern Ontario Pain Scale

Apps that work

- Are easy to learn
- Have many choices
- Have an auditory component
- Do not require long term investment

Strategies for App success

- Have several to choose from
- Introduce it several minutes before the procedure starts
- Know the basics of how your apps work


Procedure Strategy

- Analgesia
- Anxiolysis
- Distraction

Take Home Points

• Encourage a calm, relaxed atmosphere
• Use topical anesthetics whenever possible
• Buffer lidocaine for injection
• Inject slowly and deeply first
• Distraction is key: Apps, music or even talking

Thank you!

peterlia@gmail.com