Local Anesthesia in Infusion Therapy

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Disclosures

• Speaker's Bureau: Janssen Pharmaceuticals

Question #1

• How often do you use/apply a pre-anesthetic prior to starting an IV?
  A. Always
  B. Sometimes
  C. Rarely
  D. Never
Question #2

When using local anesthetic for adults, are you more inclined to use:
A. Intradermal lidocaine (unbuffered)
B. Intradermal Buffered lidocaine
C. Intradermal Bacteriostatic Saline
D. Topical lidocaine cream or patch
E. Other

Question #3

When using local anesthetic for children, are you more inclined to use:
A. Intradermal lidocaine (unbuffered or buffered)
B. E.M.L.A.
C. LMX4
D. Iontophoresis
E. Other

Session Abstract

Local anesthesia is an important component in infusion therapy, helping to decrease pain and anxiety of patients during peripheral intravenous access. While saline and lidocaine are the most commonly used products, other products have been developed for various infusion settings. Proper administration of local anesthetic agents, as well as selection of the most appropriate agent, promotes successful peripheral venipuncture. This session will discuss the pharmacokinetics of local anesthetics, side effects and contraindications for use, and best practice administration techniques.
“It is easier to find men who will volunteer to die, than to find those who are willing to endure pain with patience.”

Julius Caesar

As nurses, we have the opportunity to create a patient-care environment where pain is minimized – or eliminated completely. Why would we choose not to do that?

Learning Objectives

1. Identify the pharmacokinetics of the available local anesthetic agents.
2. Describe administration techniques that improve efficacy or comfort in local anesthesia delivery.
Literature review

- Cochrane database of systematic reviews (CDSR)
- National guidelines clearinghouse
- CINAHL
- PUBMED/MedLine

Key words
- Venipuncture and Pain
  - Local anesthesia/anaesthetic
  - Topical anesthesia/anaesthetic
- Limits
  - English
  - Research/evidence
  - 2000 – 2014
  - Adults (search #1)
  - Children (search #2)

Cochrane Systematic Reviews

- Psychological interventions for needle-related procedural pain and distress in children and adolescents (2013 Review)
- Topical anaesthesia for needle-related pain in newborn infants (2013 Protocol)
- Adjusting the pH of lidocaine for reducing pain on injection (2010 Review)
- EMLA and Amethocaine for reduction of children’s pain associated with needle insertion (2006 Review)

http://www.cochrane.org/cochrane-reviews

Practice Guidelines

- National Guidelines clearinghouse
  - Search
    - IV therapy
    - Local anesthesia for VIT = 0
    - Local anesthesia for intravenous therapy = 0
    - Topical anesthesia = 47
      - None relevant
    - Local anesthesia – limited to venipuncture
      - 1 relevant (submitted by ENA)
  - Infusion Nurse Society SOP
EBP Process

Keyword Search
1988 – 2014
N=291

1988 – 2014: n = 121
2000 – 2014: n = 95

Adding exclusion criteria:
N = 66 titles to review

EBP PROCESS, CONTINUED

66 titles reviewed → 31 articles selected → + 1 national guideline

36 papers examined → + 4 Cochrane Systematic Reviews

Neonates, Infants, and Children

- Consensus
  - Minimize or Eliminate Pain
  - Pharmacologic Agents
  - Non-pharmacologic Agents
  - Child life specialists
Adults

Inconsistencies?

• Differences in Methodology
  – Sample Size
  – Adequate power to detect differences
  – Technique (Internal Validity of Study)
  – Differences in pain measurement
    • Scale
    • Timing

Bottom Line
Local Anesthesia prior to starting IVs
reduces pain and anxiety in adults and
children in various settings
**Current Standards**

**PROCEDURAL PAIN MANAGEMENT**

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**Eutectic Mixture of Local Anesthetic (E.M.L.A.)**

- 2.5% lidocaine with 2.5% Prilocaine
- Cream/Patch (Disc) approved for PIV
- Minimal risk of toxicity
- Anesthetic Response within 45 – 60 minutes
- Duration of Action ~ 2 hours
  - drug clearance varies with site
- Cover with occlusive dressing for maximal absorption

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**Procedure**

- Apply
- Cover
- Wait
- Cleanse Skin
- Start IV per protocol

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**EMLA DOSING**

- 0 - 3 months (< 5 kg)
  - 1 gm over 10 cm²; up to 1 hour
- 3 - 12 months (> 5 kg)
  - 2 gm over 20 cm²; up to 4 hours
- 1 – 6 years (> 10 kg)
  - 10 gm over 100 cm²; up to 4 hours
- 7 – 12 years (> 20 kg)
  - 20 gm over 200 cm²; up to 4 hours

**Risks associated with EMLA**

- Potential for Methemoglobinemia
  - Do not use with
    - Neonates < 37 weeks GA
    - Infants receiving other drugs that can cause Methemoglobinemia, e.g., phenytoin, APAP

**LMX4**

- 4% Liposomal Lidocaine
- Area of application < 100 cm²
- Onset: 20 – 30’
- Duration: ~ 1 hour following application
- OTC product
  - Used for pruritus
- Not for use on broken skin
- No association with methemoglobinemia
General Application Info

- Don’t cleanse skin before application
- Wear gloves to apply
- Apply thick layer of LMX4
- Cover with occlusive dressing
  - Protects child
- Leave in place for 30 minutes
- Remove product, cleanse area per protocol and start IV

Ethyl Chloride

- Vapocoolant
- Not so commonly used
- Procedure
  - Hold canister 3 – 7 inches from skin
  - Spray continuously x 4 – 10 seconds
- Insert cannula immediately
  - Product has limited duration of effect

Needle-Free Pressurized Delivery Systems

J-Tip
- Compressed CO₂
- Delivery System
- User fills system with 1% or 2% buffered lidocaine powder

Zingo
- Syringe prefilled with 0.5 mg sterile lidocaine powder
- Pressurized helium
**J-Tip**

- Not recommended for patients receiving chemotherapeutic agents or blood thinners, patients with blood disorders, or preterm infants or neonates.
- User experience needed
- Noisy as excess gas is released
- Creative distraction needed

**Zingo (0.5 mg lidocaine HCl monohydrate)**

- Apply 1 – 3 minutes prior to IV start
- Use on intact skin
- Second application at a different site acceptable
- Local anesthetics have additive toxicities

**J-Tip Video**

- [http://www.youtube.com/watch?v=CGzr1xIzAY](http://www.youtube.com/watch?v=CGzr1xIzAY)
**Summary**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Active Ingredient</th>
<th>Time to Onset</th>
<th>Duration</th>
<th>ADRs</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMLA</td>
<td>Lidocaine 2.5%</td>
<td>45 – 60 minutes</td>
<td>~ 2 hours</td>
<td>Local blanching, redness, erythema, methemoglobinemia</td>
</tr>
<tr>
<td>LMX4</td>
<td>Liposomal Lidocaine</td>
<td>20 - 30 minutes</td>
<td>~ 1 hour</td>
<td>Redness, itching, irritation, rash</td>
</tr>
<tr>
<td>Gebauer’s</td>
<td>Ethyl Chloride</td>
<td>Upon application</td>
<td>15 seconds</td>
<td>Changes in pigmentation</td>
</tr>
<tr>
<td>Synera</td>
<td>70 mg Lidocaine</td>
<td>20 – 30 minutes</td>
<td>~ 3 hours</td>
<td>Blanching, Redness</td>
</tr>
<tr>
<td>J tip Lidocaine</td>
<td>~ 1.5 minutes</td>
<td></td>
<td></td>
<td>Bruising, bleeding</td>
</tr>
<tr>
<td>Zingo</td>
<td>0.5% Lidocaine</td>
<td>1 – 3 minutes</td>
<td>10 minutes</td>
<td>Stinging, burning, pain, contusion, hemorrhage</td>
</tr>
</tbody>
</table>

**Intradermal Options**

- **Lidocaine**
  - UnBuffered
  - Buffered

- **Bacteriostatic Saline**
  - Widely available
  - Cost effective

**Re: Intradermal options**

- Buffered lidocaine is more comfortable than non-buffered lidocaine, but it's most expensive
- Lidocaine is more effective than bacteriostatic saline
- Saline is more effective than nothing at all and it's least expensive
- Not clear if this is generalizable to all populations
Procedure (INS policy)

1. Cleanse Skin with antiseptic solution; let dry
2. Draw .03 ml anesthetic into 1mL tuberculin syringe
3. With bevel up, gently insert needle intradermally above intended insertion site.
4. Aspirate to confirm no blood return
5. Inject 0.1 – 0.3 mL anesthetic to form wheal at access site
6. Remove needle and discard into sharps container
7. Proceed with site preparation and insertion

Adjunctive procedures

• Heat
• Sucrose
• Distraction

“In the case of procedural pain, the overriding imperative is that, as health professionals, we have the responsibility to recognize and adequately manage this type of pain, because we are responsible for inflicting it.”

Question #4

Based on the information given, I am more likely to use local anesthetic prior to IV starts in the future.

A. True
B. False

Thanks so much!
Larry Kanfer photograph of the Illinois Prairie