Getting in the nose: Intranasal Fentanyl
Acknowledgements

Adopted for CAPHC’s Community of Practice for Pain

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Objectives

• To review technique and physiology of intranasal medication delivery

• To review medications which can be used via IN route

• To explore novel IN initiatives and treatments
Nasal Anatomy

• The anterior nasal cavity, known as the **nasal vestibule**, is the main site of intranasal drug

• Good absorption due to:
  – relatively large surface area
  – covered by squamous and transition epithelial cells

• Bordering this area is respiratory epithelium:
  – poor drug absorption
  – moves drug away from nose into the pharynx
Nasal Anatomy
First Pass Metabolism

- Oral meds may sit in stomach for 30-40 min
- All blood from intestines passes through hepatic circulation before passing to body
- 90% of oral meds are metabolized here
First Pass Metabolism

- IN medications absorbed from the nose bypasses first pass hepatic metabolism
- Blood from nose drains directly into superior vena cava
- In theory may also be able to cross olfactory nerve pathway directly into CSF – even in apneic patient
Administration using Dropper

- Medication can be delivered into the nose using a dropper, and simply dropping into the nose
- The best position would be for the child lying
- This method is limited because:
  - Much of the medication ends up in the oropharynx
  - Takes a long time
  - Not well tolerated by children
Administration using Atomizer

– Better disposition is achieved with an atomizer

– Best position:
  • Bed should be up about 45 degrees and atomizer should be pointed slightly up and outward towards the top of the ear on the same side
  • If using atomizer don’t forget to account for dead space (usually about 0.1 ml)
    – i.e. If dose required =0.5mL would need to draw 0.6 mL to allow for the 0.1 mL that remains in the atomizer
Administration

• Absorption is affected by:
  – Location – if atomizer is pointed in wrong direction can result in run off into the posterior pharynx
  – Surface area of the vestibule - Volumes of 0.3ml or less are best tolerated but can take up to 0.5ml/nare
  – Medical conditions –
    • Cystic fibrosis which may affect ciliary function
    • Nasal polyps decrease surface area for absorption
    • Rhinitis, nasal secretions, epistaxis can decreased drug contact
Best Medications for IN Use

- Low molecular weight
- Highly lipophilic
- No net charge at physiologic pH (4.5-6.5)
Uses for IN medications

• Sedation and analgesia
• Vaccine delivery
• Treatment of diabetes insipidus, rhinosinusitis, seizures, and migraines
• Delivery of opioid antagonists
• Delivery of glucagon
FENTANYL
Fentanyl

- Potent and highly selective opioid agonist that works primarily at the mu receptor
- Primarily metabolized in the liver
- Rapid onset and short duration of action
- No inherent anxiolytic or amnestic properties and sedation does not occur at low doses
Fentanyl

- Cochrane Review from 2015
- 3 studies included:
  - INF vs. IM morphine
  - INF vs. IV morphine
  - INF 300 mcg/mL vs. INF 50mcg/mL (used same dose 1.5mcg/kg in both groups)
Cochrane Review

• All methods of analgesia had pain reduction at 10 min post administration:
  – Greater pain reduction with INF vs IM morphine
  – No difference in pain reduction when compared to IV morphine

• Dose of INF for all studies: 1-1.5 mcg/kg

• Limitation: all studies done in children over 3 years
Fentanyl

• 2009 study looking at children 1-3 years
• 46 children included in study
• INF dose = 1.5 mcg/kg
Fentanyl

- INF results in clinically and statistically significant decrease in FLACC scores:
  - 93% of children 10 min post fentanyl (FLACC 8 to 2)
  - 98% of children 30 min post fentanyl (FLACC 8 to 0)
- Intranasal fentanyl delivery using a mucosal atomiser was well tolerated by all children
Intranasal Fentanyl for Pain Management in Children: A Systematic Review of the Literature

Shawna Mudd, DNP, PNP-BC

- Children 6 months – 18 years
- Dose 1-2 mcg/kg
- Better tolerated than IM morphine, effective for relieving pain and agitation
- Decreased need for IV insertion and may decrease time to analgesia
Clinical Pathways

- Often delays to pain medication in children
- IN fentanyl has shown to relieve pain 30min faster than IV morphine
- Retrospective chart review looking at:
  - Time to IN fentanyl vs morphine with pain pathway
  - LOS in ED
  - Pain reduction with both modalities
- Significant decrease in time to pain medication but did not affect length of stay, and effectiveness of pain management was the same.

Clinical Pathways

**Time to Pain Medication**

**Length of Stay**

FIGURE 1. Time to pain medication administration by form of pain medication. Circle represents mild outlier which lies beyond Q1 - 1.5*IQR or Q3 + 1.5*IQR but is not an extreme outlier. IQR is defined as Q3 - Q1, the height of the box.

FIGURE 2. Length of ED stay stratified by form of pain medication after excluding reductions and surgeries (n = 33). Asterisk represents extreme outlier which lies beyond Q1 - 3*IQR or Q3 + 3*IQR. Circle represents mild outlier which lies beyond Q1 - 1.5*IQR or Q3 + 1.5*IQR but is not an extreme outlier. IQR is defined as Q3 - Q1, the height of the box.

Take Away Points

- Intranasal fentanyl is an effective, safe and well-tolerated mode of analgesia for children aged 1–18 years with moderate to severe pain.
- Atomizer best method of delivery
- Dose 1 – 1.5 mcg/kg fentanyl IN
- Similar pain relief to IV morphine but without requiring IV access
- Use of INF decreases time to analgesia for children
- Not necessarily for repeated doses
- Best to start analgesic provision for moderate-severe pain