Mucosal Atomization Device
Physiology

**First pass absorption**

Molecules absorbed via ingestion enter the portal circulation and are transported to the liver. Enzymes break down most of the drug and a small percentage enters the circulation as active drug.

When delivered nasally, the drug is not affected by first pass metabolism.
Physiology

- Nose brain pathway
  - Membranes of the nose are in direct contact with the brain and CSF
  - Meds absorbed across the membranes directly enter the CSF
  - The nose offers a rapid, direct route from drug delivery to the brain
Physiology

- Amount of drug absorbed
  - IV meds = 100%
  - Oral meds = 5-10% because of destruction in the digestive system and liver
  - IN (intranasal) vary, Narcan is very near to 100% (same as IV)
  - IV and IN serum levels are similar after about 2-3 minutes
Factors Affecting Absorption

Medications

- Molecular size
- Lipophilicity (Affinity for fat)
- pH
- Drug concentration
- Properties of the solution
Factors Affecting Absorption

Volume and Concentration

High volume or low concentration may lead to failure because the drug cannot be absorbed in enough quantity to be effective.

Volumes over \( \frac{1}{2} \) to 1 mL per nostril are too large; may result in runoff out of the nose.
Factors Affecting Absorption

- Nasal mucosal characteristics
  - Nasal mucosa is defective it may not absorb meds effectively
  - Vasoconstrictors
  - Epistaxis, nasal congestion, mucous discharge prevent mucosal contact of drug
  - Destruction of mucosa from surgery or past cocaine abuse results in mucosa to absorb the drug.
Factors Affecting Absorption

- Particle size
  - Particle size 10-50 microns adheres best to the nasal mucosa
  - Smaller particles pass on to the lungs
  - Larger particles from droplets and run out of the nose
Contraindications

- Epistaxis, trauma, septal abnormality, nasal congestion, mucous discharge
- Destruction of nasal mucosa from surgery or past cocaine abuse
Advantages of IN medications

- Avoid needle stick injuries
- IN meds offer a needleless solution to drug delivery
- Easy/Convenient
- Nose - rapid access point for meds
- Painless
- Little special training is required to use the device
Drugs

- Narcan (naloxone)
- Versed (midazolam)
- Glucagon
Narcan

- Absorption almost as fast as IV
- Delivery: Immediately on decision to treat, inject into nose, then begin IMC
- Successful awakening may eliminate the need for any IV or further ALS care
Narcan

- Gradual increase in LOC, respiratory status improves fast or faster than IV due to elimination of IV access delay
- NOT 100% effective. If needed follow with IV along with reassessment for other causes of altered mental status
Action

- Narcotic antagonist
- Reverses effects of opiate drugs, narcotics/synthetic narcotics: morphine, Dilaudid, Fentanyl, Demeral, Paregoric, Methadone, Heroin, Percodan, Tylox, Nubain, Stadol, Talwin, Darvon
Indications

- Narcotic/synthetic narcotic OD
- Coma of unknown etiology with respiratory depression and/or constricted pupils
Contraindications/Precautions

- Hypersensitivity
- Use with caution in patients dependent on narcotics as it may cause withdrawal syndrome
- Rapid reversal of opiate in patients who took combination drugs including stimulants may result in rapid tachycardias.
Side Effects

- CNS: Sedation, H/A
- CV: ↓ SVR, ↓ BP, ↓ P
- Resp: Depression
- Eyes: Dry eyes, blurred vision
- GI: N/V
- Skin: Rashes, itching
Interactions

- Depressive effects enhanced if used with other sedatives, hypnotics, antihistamines, anti-emetics, barbiturates, ETOH.
Narcan IN Administration

- Inspect nostrils for mucus, blood or other problems that might inhibit absorption
- Fill syringe with appropriate dose (2 mg for adults) (0.1 mg/kg up to 2 mg single dose for peds).
- Expel air from syringe
- Attach the MAD device via luer lock
- Briskly compress syringe plunger via rapid intranasal mist spray (no more than 0.5-1 mL per nostril).
Narcan IN Administration

- Secure airway as needed
- No response in 3-5 minutes, may repeat the dose.
- Increase in LOC eliminates need for IV or further ALS care
Narcan IN Administration

Gradual increase in LOC with adequate respiratory efforts: Continue to monitor for 3-5 minutes.
Versed (Midazolam)

- Water-soluble benzodiazepine
- Thick and alkalotic
- CNS depressant
- Sedative/hypnotic
- Sleep induction
- ↓ anxiety
- Amnesia
- Fast onset/offset
Indications

- Sedation prior to DAI and/or cardioversion
- Seizures
- Severe anxiety/agitation
Contraindications

- Known hypersensitivity
- Glaucoma; shock
- Pregnancy unless seizing
- Dose for sedation generally ↓ with:
  - Age > 60
  - Debilitated patients with chronic disease
  - Those on narcotics or CNS depressants
IN dose: Anxiety or seizures:
(0.2 mg/kg IN) up to 10 mg.
Deliver immediately on decision to treat; then begin IMC
NOT 100% effective – may need follow-up with IV therapy
Side Effects

- Drowsiness
- Sedation
- Confusion
- Amnesia
- Ataxia
- Respiratory depression
- Hypotension
IN Versed Administration

- Inspect nostrils for mucus, blood or other problems that might inhibit absorption
- Fill syringe with appropriate dose
- Attach the MAD device via luer lock
- Briskly compress syringe to administer $\frac{1}{2}$ of volume (no more than 0.5 - 1 mL per nostril)
IV Versed Administration

- Secure airway as needed
- If no response to IN administration in 5 minutes give IV or IM versed dose per SOP
Glucagon

- Increases blood glucose by converting liver glycogen stores to glucose
- Stimulates release of catecholamines causing ↑HR and contractility
- Allows for improved cardiac output
- Peaks in <20 minutes
Indications

- Anaphylaxis if a history of CVD, HTN, pregnant or on beta blockers and not responding to Epi.
- Symptomatic bradycardia with pulse if on Beta or Ca blockers and unresponsive to atropine and pacing
- Hypoglycemia without IV
- Beta/Ca blocker OD if P<60 and BP<90 and not responding to atropine or pacing
Contraindications

- Chronic hypoglycemia
- Adrenal insufficiency
- Adrenal tumor
- Will not be effective in treating hypoglycemia if no glycogen stores: peds, liver disease, starvation
- Hypersensitivity
Side Effects

- ↑ HR
- Allergic reaction
- N/V
- Dsypnea
Dose

Anaphylaxis

If history CVD, HTN, pregnant or on Beta/Ca blockers and not responding to Epi or Dopamine

1 mg IVP/IN/IO/IM   May repeat x1
Dose

- Symptomatic bradycardia with pulse
- If on Beta/Ca blockers and unresponsive to atropine and pacing
- 1 mg IVP/IN/IO  May repeat every 1 minute up to total dose of 3 mg as needed
Dose

- Beta/Ca blocker overdose
  - If pulse < 60 and BP < 90 and unresponsive to atropine and pacing per bradycardia SOP
  - 1 mg IVP/IN/IO/IM. May need initial dose of 3 mg
Dose

- Hypoglycemia without IV
- 1 mg IM/IN/IO

NOTE: Mix diluent with powder, Roll the vial. DON'T SHAKE
QUESTIONS?