Nasal Drug Delivery Techniques

In the prehospital setting most medications are administered intravenously. The IV method is an excellent mechanism to get the drug into the blood stream as quickly as possible where it can begin working. However there are times when IV access either cannot be attained or to do so might be dangerous due to blood borne pathogens or a violent patient.

An alternative technique is to administer some medications 'through the nose' (intranasal or IN). The nasal mucosa is actually an excellent place to absorb drugs and medications. It has a large surface area and a good blood supply. (Snorting cocaine through the nose has been popular for many decades). When the medication is absorbed it is absorbed directly into the blood stream and begins working almost as quickly as an IV injection.

There are advantages to delivering a medication via the IN route. It is a needleless method which means it is less painful for the patient and safer for the Paramedic (less exposure to blood borne pathogens) There are also situations where the chances of successfully starting an IV can be very low.

Not all medications can be delivered intranasally. The viscosity can't be too high (too thick of a liquid) and the chemical makeup of the drug has to be correct to cross the cell membranes, (lipophilic drugs are easily absorbed) so not all prehospital medications can be used, but two drugs can be; Naloxone and Midazolam.

Essentially the medication is sprayed into the nose (much like a decongestant) but it has to be delivered at the correct droplet size to work properly. (10-50 microns) Too small of droplets and the drug is inhaled into the lungs. Too large of droplets and it drips out of the nose and runs down the throat. Either way the drug is not delivered into the blood stream.

This optimal droplet size is accomplished by attaching a special sprayer cap to the end of the syringe. In LA County, the only accepted device is the "MAD Nasal" device by the LMA Corporation. (MAD = Mucosal Atomization Device)

The procedure is simple enough. The drug is drawn into a syringe to which is added a special atomizer cap. The atomizer is placed into the nostril and the syringe is compressed briskly. When the plunger is depressed firmly and quickly the liquid is atomized to the correct size. Gently pushing the plunger will not result in atomization.

Some calculations need to be considered to ensure proper drug delivery. If the drug is too diluted it will not be absorbed in a high enough quantity. Too much volume and it just runs out the nose. This means that there is a maximum volume of 1mL per nostril.

Respiratory distress or ALOC – administer Narcan 2mg - Narcan comes in different strengths. (0.4mg/ml and 1mg/ml) For intranasal use draw up 1mg (1ml) into each of two syringes and attach the Mucosal Administration Device to the syringe. Then spray 1ml into each nostril.

Active Seizures – Administer Midazolam 5mg – Draw up 1ml into one syringe and spray into one nostril. If seizures continue may repeat 5mg one time. Draw up and spray into other nostril.

Sedation prior to cardioversion - 2.5mg IN (if unable to obtain an IV) MR every 10 min to max of 10mg.

Pediatric patients receive their appropriate dose. There is no lower age limit for intranasal administration. It can be used on newborns if necessary.

Give half the dose of drug in each nostril to maximize surface area for absorption

It should be noted that intranasal are Not 100% effective so failures to achieve therapeutic drug effects need to be followed with IV dosing.

Why might the intranasal route fail? There might be problems with the characteristics of the nasal mucosal

If there is something wrong with the nasal mucosa it may not absorb medications effectively. Examples:

- Vasoconstrictors such as cocaine prevent absorption.
- Bloody nose, nasal congestion, & mucous discharge all prevent mucosal contact of drug.
- Destruction of nasal mucosa from surgery or cocaine abuse – no mucosa to absorb the drug.

What you need to know:

Nasal drug delivery is convenient and easy, but it may not always be effective.

Nasal drug delivery cannot completely replace the need for injections.

Being aware of the limitations and using the correct equipment and drug concentrations will assist you in predicting times when nasal drug delivery may not be effective.

Pediatric Inhalational Epinephrine

Another situation when medication is administered directly through the mouth & nose is epinephrine for croup. Croup is a viral disease that causes swelling around the vocal cords. This represents an airway obstruction and children that have it have a ‘seal like’ barking cough. It is a serious form of respiratory distress that can benefit from treatment. Epinephrine can reduce the swelling and open up the airways. A good method of administration is inhalational.

The dose is 2.5mg for children below age 1 and 5mg for children over the age of one. Use the 1:1000 Epinephrine (1mg/ml), pour the correct dose into a hand held atomizer and then add 5ml of normal saline.

Use of this treatment requires base station contact and an appropriate order. The child gets only one dose en route. Do continue to monitor vital signs as symptoms such as tachycardia, dysrhythmias, anxiety and headache can occur. Also this treatment might be so effective that the parents might think their child is cured and want to sign out AMA. This is not advisable. Remind parents that a rebound respiratory distress can occur and the second bout might be worse than the first.

Also, while adults can get croup this therapy is NOT FOR ADULTS it is for children only.