



Intranasal Medication Administration

EVIDENCE INFORMED PRACTICE TOOLS

November 2017

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PURPOSE AND INTENT

Intranasal medication administration offers a non-invasive alternative route in medication delivery when other routes are not available or will result in an unacceptable delay in medication effectiveness.

This evidence informed practice tool has been developed to:

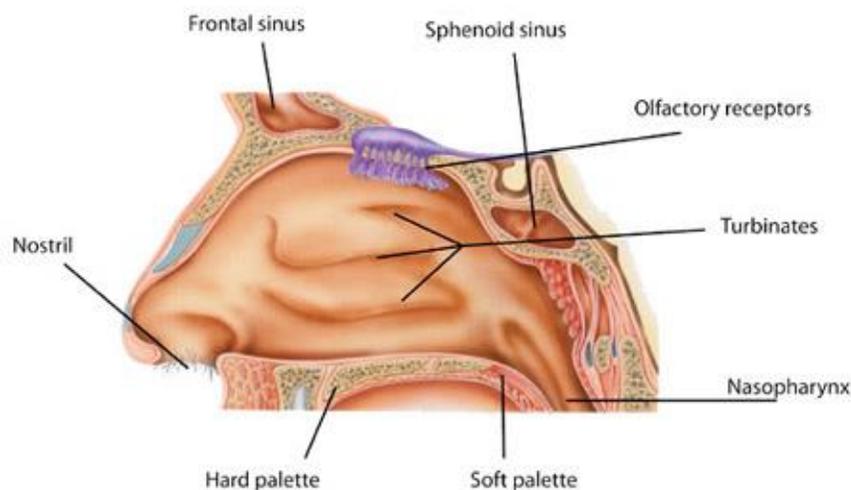
1. Review current evidence about the pharmacokinetics of intranasal medication administration
2. Review clinical indications and limitations when considering intranasal medication administration
3. Provide a procedure that will support staff in administering intranasal medications
4. Provide examples of medications that may be administered intranasally
5. Provide examples of patient and family teaching resources

1. Definitions

1. **Lipophilic:** Capable of dissolving, of being dissolved in or of absorbing lipids (Stedman's Medical Dictionary). Cell membranes such as the nasal mucosa or the blood-brain barrier have a lipid bilayer; medications that are lipophilic can cross these membranes more quickly
2. **Bioavailability:** The proportion of the administered dose that enters the bloodstream and is available to the site of action
 - Intravenous is considered to have 100% bioavailability
3. **First-pass Metabolism:** Medications that are absorbed through the gastrointestinal system and undergo metabolism in the liver prior to reaching systemic circulation
4. **Mucosal atomization device (MAD):** A nasal spray device that delivers a fine mist of soluble medication particles to the nasal mucosa for direct absorption into the bloodstream.
5. **Incident Pain / Incident Dyspnea:** Pain or dyspnea that directly results from an action or activity, lending itself to pre-emptive analgesia for planned activities that cause pain or dyspnea. Circumstances that may cause incident pain or dyspnea include:
 - Planned turns or transfers
 - Bathing / physical care
 - Wound care / Dressing changes
 - Catheterization / Disimpaction

2. Mechanism of Nasal Medication Absorption

The nasal cavity consists of three main areas; the vestibule, atrium and respiratory region. The respiratory region is divided by epithelial folds (turbinates) which function to warm and filter air that is moving to the lungs. This folded structure provides a large, vascular surface area through which medications can be absorbed directly into the bloodstream. The olfactory region at the roof of the nasal cavity may also have a role in the transmission of medications directly into the central nervous system.



(www.sinomarin.com)

Low molecular weight, lipophilic medications (such as fentanyl) tend to result in a better bioavailability and systemic effect than high molecular weight or hydrophilic drugs because they readily pass through the cellular membrane and into the vascular system. They reach the bloodstream more quickly and with greater bioavailability because they bypass first-pass metabolism (i.e. medications do not undergo absorption through the gastrointestinal tract and metabolism by the liver prior to reaching the bloodstream).

3. Clinical Considerations when Selecting the Intranasal Route

Advantages to Intranasal Medication Administration include:

- Non-invasive, easily administered and generally well tolerated (although some medications may be irritating to the nasal mucosa e.g. midazolam)
- Rapid onset – medications are directly absorbed through the nasal mucosa into systemic circulation
- Higher bioavailability than oral medications as first pass hepatic metabolism is bypassed
- May potentially circumvent the blood-brain barrier (through olfactory region of the central nervous system)

- More consistent absorption and bioavailability in comparison to sublingual administration (particularly if the patient is unable to avoid swallowing the medication, has excess salivary secretions or altered skin integrity in the mouth – e.g. ALS, head and neck cancer)
- Provides alternate route for rapid medication delivery when IV access is unavailable or there is a high risk of needle-stick injury (e.g. seizure)
- Preferable to subcutaneous or intramuscular medication administration in the context of symptom crisis (severe pain, severe dyspnea or acute bleeding – apart from epistaxis) particularly if circulation to the extremities and subcutaneous tissue is impaired.
- Patients and families can be taught to self-administer medications using the MAD device (route can be used across care settings)

Limitations to Intranasal Medication Administration include:

- Optimal systemic absorption is limited to lipophilic, small molecular weight medications (large molecular weight medications will have limited systemic absorption)
- The physiologic pH of the nasal mucosa is 5.0 – 7.0. Medications with pH outside of physiologic range may cause irritation to the nasal mucosa and may effect absorption (Gibaldi's Drug Delivery Systems in Pharmaceutical Care Desai & Lee eds. 2007)
- Congestion, bleeding, or obstruction in the nose may prevent the administration of the medication (allergic rhinitis has not been shown to affect absorption however treatment with nasal vasoconstrictors does impair absorption)
- Studies suggest the ideal volume per nostril is 0.2-0.3 ml; in practice, the maximum volume for single administration into one nostril (in adults and pediatrics) is 0.5 ml and 0.1 ml in neonates. Larger volumes should be divided (i.e. half dose in each nostril).
- Feasibility may be limited in the context of a patient who is dependent on high flow nasal oxygen administration and non-invasive ventilator support (use of intranasal medications should be considered in the context of the clinical situation)
- Intranasal medications may be contraindicated in the context of:
 - recent radiation to the head and neck / friable nasal mucosa
 - high risk of serious bleeding due to tumor
 - history of coagulopathy disorder
 - neutropenia / thrombocytopenia

4. Medications that may be administered intranasally

The intranasal route of drug administration has been used for a variety of medications, such as vaccines (Flumist® AstraZeneca Canada Inc, 2014), antihistamines and decongestants (www.drugs.com), opioids (Harlos et al., 2013; Hjortkjaer et al, 2002), benzodiazepines (Humphries & Eiland, 2013), and migraine therapies (Veldhorst-Janssen, et al., 2009). Intranasal therapies may be commercially prepared with a built in atomizer (for example intranasal decongestants, topical steroids or Flumist® vaccine), or alternatively the parenteral preparation of certain medications may be administered using a mucosal atomization device

(MAD®). For reasons described above, not all parenteral medications may be appropriate for intranasal use. The chemical properties, pH and concentration of the medication contribute to whether or not the medication will be well tolerated, adequately absorbed or effective.

Consult with the regional medication monograph to determine if a medication is approved for intranasal administration.

5. Procedure for Intranasal Medication Administration using a Mucosal Atomization Device

 Winnipeg Regional Health Authority Office régional de la santé de Winnipeg <i>Caring for Health À l'écoute de notre santé</i>	MEDICATION ADMINISTRATION: INTRANASAL ATOMIZATION USING MAD® DEVICE		NO.
	Approved by:		Page 1 of 3
	Effective date:	Section:	
	Approval signature:	Supercedes:	

1.0 **PURPOSE:**

- 1.1 To safely administer a prescribed intranasal medication using the Mucosal Atomization Device (MAD®)

2.0 **INDICATIONS:**

- 2.1 The intra-nasal route provides a non-invasive route of medication delivery for approved medications when other routes are not available or will result in an unacceptable delay in medication effectiveness.

3.0 **PROCEDURE:**

EQUIPMENT

- Medication as ordered
- 1 cc luer lock syringe
- Blunt filter needle if drawing medication from a glass ampule

- Mucosal Atomization Device (MAD®)
- Specimen cup labeled with patient's name for storage of device at bedside for re-use
- Disposable cup of tap water for rinsing the MAD® device after use
 - Use water from medication room or jug on medication cart, not from patient's washroom.
- Facial tissue
- Clean gloves (non-sterile)

RATIONALE

3.1 Perform hand hygiene

3.2 Draw the prescribed amount of medication into a 1 cc luer lock syringe using the most concentrated form of the medication available. Draw an additional 0.1 ml of medication to account for the medication that will remain within the MAD® device (dead space) unless this has been accounted for in the physician order

Using a concentrated form of the medication reduces the volume to be administered
The MAD® device has a dead space of 0.1 ml

3.3 For first time administration, connect a new MAD® device to the syringe via luer lock mechanism. If the patient has a previously used device at the bedside, cover the medication syringe with a blunt cannula or sterile cap until the MAD® device can be attached at the bedside.



In hospital, the patient's personal MAD® device must remain at the bedside (not the medication preparation area) to reduce potential transmission of infection

3.4 Determine the volume of medication to be administered in each nostril by dividing the volume in half

Splitting the dose doubles the available mucosa surface area and increases absorption

** If the volume per nostril exceeds 0.5 ml, the dose should be administered in two separate applications 5 – 10 minutes apart

Spacing between doses allows the former dose to absorb

3.5 Explain the procedure and expected outcome to the patient and family

3.6 Perform hand hygiene and don clean gloves

3.7 Inspect nostrils for blood or discharge that may impair drug absorption and have patient blow their nose to clear passage if possible

Secretions may impair drug absorption

3.7 Position the patient upright with head back slightly or lying in bed. The patient does not have to inhale as the medication is administered (the device will deposit medication to the appropriate location for absorption)



3.8 Place the tip of the MAD® device into the nostril aiming slightly up and outward (toward the top of the outer ear)

In neonates or small children, removal of foam tip may provide better fit

3.9 **Briskly** compress the syringe plunger to deliver approximately **half** the medication into each nostril

Brisk pressure causes atomization of medication and improved absorption

3.10 Rinse MAD® device with clean tap water drawing water into the device using the syringe. Squirt water and residual medication out of the device into a basin and clear the dead space by retracting and depressing the plunger to expel air through the device.

In hospital, rinse the device at the patient bedside using a disposable cup of clean tap water (do not rinse in shared patient bathroom, kitchen or medication prep area to reduce the risk of infection transmission)

3.11 Remove the syringe from the MAD® device and discard the syringe

3.12 Remove the foam cone tip from the device squeezing out any residual moisture and place the clear plastic channel and cone tip (facing up) in clean, labeled specimen container

Allow the device to dry in a container left open to air. Reassemble foam tip and plastic channel with next use.

3.13 Store device in a labeled specimen container left open to air at the patient's bedside for future use. Consider discarding and using new device if visibly soiled/cracked/ripped

There is little evidence to support frequency of MAD device replacement. Use clinical judgement.

3.14 Discard water from cup and basin in patient's sink. Discard cup and reprocess basin as per site practice.

3.15 Remove gloves and perform hand hygiene.

4.0 DOCUMENTATION:

4.1 Document in the patient's health record according to program or unit protocol.

Include information about patient tolerance of procedure and effect of medication.

6. Example of Patient and Family Teaching Resources

Nasal sprays are a liquid solution or suspension of medicine. They are sprayed into the nostrils, usually to produce a local effect directly inside the nose.

Some nasal sprays are used to administer medicine that acts on other parts of the body. In these cases the medicine is taken into the bloodstream from the lining of the nose, which has many blood vessels.

The medication may come with a built in spray device or your nurse or pharmacist may draw medicine into a syringe to be given with a detachable spray device (such as a Mucosal Atomization Device or MAD® device)

To administer medicine using a MAD® device, follow these steps:

1. Wash your hands with soap and warm water.
2. Gently blow your nose with a tissue.
3. Twist on the MAD® device to the screw tip end of the syringe.



4. Firmly fit the tip of the MAD[®] device in the nostril pointing toward the tip of your outer ear and press firmly to give about half of the medication. A good amount of pressure creates a fine spray of medicine that will be better absorbed. The person does not have to inhale while the medication is sprayed. The device will ensure the medication reaches the part of the nasal passage where it will be absorbed.
5. Fit the MAD[®] device in the other nostril and give the remaining medication, again using a good amount of pressure.
6. Rinse the MAD[®] device using clean tap water while pulling back on the syringe plunger to draw water into the syringe. Squirt the water and any left-over medication out of the syringe and into the sink. Use the empty syringe to squirt air through the device so that there is no liquid left within the MAD[®] device.
7. Remove the white foam cone tip from the inner plastic channel and squeeze out any residual water from the foam cone tip
8. Allow the MAD[®] device pieces to dry in a clean container that is open to air until it is needed again. Do not close the MAD[®] device in a plastic bag or container with a lid because it will not dry properly. Use a new device if it looks dirty, cracked or ripped after cleaning.
9. Wash your hands with soap and warm water.

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8. Working Group Participants

Lisa Streeter RN MN CHPCN(c)
Clinical Nurse Specialist
WRHA Palliative Care Program

Dr. Mike Harlos
Medical Director
WRHA Palliative Care Program

Dana Male, BN RN
Infection Control Professional
WRHA Infection Prevention and Control Program

Carol Mydlo, RN
Clinical Resource Nurse
HSC Adult Medicine

Sarah Brown BSc, RN, MN, IIWCC
Clinical Nurse Specialist
WRHA Home Care Program

Gail Vande Vyvere, RN, BN, MN

Jean McLennan, RN, BSN
Educator
Women's Health Program

Norma Braun, RN
HSC A4 Medicine

Susan Heidenreich RN
HSC Women's Health 5th Floor

Shauna Paul RN, MN
WRHA Surgery Program Quality Officer

Cory Forscutt RN
CRN Children's CK5