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| |  |  |  | | --- | --- | --- | | **Huron Perth Healthcare Alliance** | | | | **1. Clinical Policies and Procedures** | Original Issue Date: | June 07, 2017 | | **Medication - Intranasal fentaNYL Delivery** | Review/Effective Date: | July 11, 2019 | | **Approved By: VP People and Chief Quality Executive** | Next Review Date: | July 11, 2021 | |
| https://intranet.hpha.ca/myalliance/imgs/spacer.gif |
| This is a CONTROLLED document for internal use only. Any documents appearing in paper form are not controlled and should be checked against the document (titled as above) on the file server prior to use. |
| |  | | --- | | **Scope:**  This policy applies to Registered Nurses who have received appropriate theoretical preparation to care for paediatric and adult patients requiring medication administration of fentaNYL via the intranasal route at the Huron Perth Healthcare Alliance (HPHA). | | **Policy**  This policy describes indications, procedural steps and contraindications for the administration of intranasal fentaNYL using a Mucosal Atomization Device (MAD) for the purpose of alleviating pain in paediatric and adult patients. The corresponding approved dosing protocol “[Intranasal fentaNYL for Management of Acute Pain](https://intranet.hpha.ca/myalliance/doc.aspx?id=6131)" shall be followed*.* | | **Purpose**  The purpose of this policy is to provide a guideline for the safe administration of intranasal fentaNYL with the use of a Mucosal Atomization Device (MAD®). It is expected that all staff shall adhere to the principles outlined in this policy. | | **Definitions:**  Mucosal Atomization Device (MAD) : consists of a soft foam conical applicator containing a plastic aerosolizer attached to a syringe. When the syringe plunger is compressed, the medication in the syringe is pushed through the aerosolizer and converted into a mist | | **Indications:**  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. Intranasal fentaNYL is indicated upon physician order to provide pain relief in patients ranging from full term newborn infants to adults, for moderate to severe acute pain requiring opiate analgesia where an IV is not otherwise indicated. | | **Considerations:**  Contraindications to administering intranasal fentaNYL include known allergy/sensitivity to fentaNYL or other opiates as well as conditions which would impair intranasal drug absorption such as:   * Facial trauma involving the nose * Bilateral blocked nasal passages such as severe nasal congestion or discharge * Nasal mucosal erosion * Epistaxis * Concomitant use of intranasal vasoconstricting drugs (e.g. decongestants or cocaine) which can inhibit absorption of intranasal medications   Use intranasal fentaNYL with **caution** in patients who have:   * recently been administered sedatives or opioids; * an altered level of consciousness; * received a monoamine oxidase inhibitor (MAOI) (risk of serotonin syndrome) or take strong CYP3A4 inhibitors (risk of fentanyl toxicity).   **For administration of intranasal medications:**  The **maximum volume** of medication administered **per nostril** is:   |  |  | | --- | --- | | Neonates and Infants up to 12 months of age | 0.5 mL per nostril | | Children over 12 months old | 1 mL per nostril | | Adults | 1 mL per nostril |  * Larger volume*s*are not reliably absorbed due to saturation of mucosal surface and drug loss in the oropharynx. * Nasal administration does not always work for every patient as absorption can be erratic. | | **Competency Requirements**  A Registered Nurse having had the appropriate theoretical preparation for and understanding of the underlying condition for which this treatment is proposed may perform this treatment on the order of a physician.  Prior to initiating any of the interventions outlined in this policy, nurses must have the knowledge, skill and ability to identify associated risks and precautions, manage potential adverse reactions and provide ongoing assessment and monitoring of the patient prior to, during and post intranasal fentaNYL administration.  The Nurse will:   * Review the HPHA policy Medication - Intranasal fentaNYL Delivery * Review the associated HPHA approved dosing protocol: [Intranasal fentaNYL for Management of Acute Pain](https://intranet.hpha.ca/myalliance/doc.aspx?id=6131) * Annually self-assess their competency to administer intranasal fentanyl, take appropriate measures to ensure competency is maintained and retain a record of related learning activities as per CNO practice standards.   **Procedure Chart:** |  |  |  | | --- | --- | | **Procedure** | **Rationale** | | **Equipment:**   * Either a 3mL syringe or 1mL syringe with removable MAD**®** device * Blunt Needle * Gloves * Tissue * Personal protective equipment (PPE) as appropriate if patient under isolation precautions. * FentaNYL as ordered and determined by Dosing protocol: [Intranasal fentaNYL for Management of Acute Pain](https://intranet.hpha.ca/myalliance/doc.aspx?id=6131) | Mucosal atomization device (MAD) Image courtesy of Teleflex.com | | **The following steps shall be followed:** | | | 1. Verify the patient’s identity using two forms of identification. | * Patient safety precaution. * **Refer to HPHA** [**Patient Identification Policy**](https://intranet.hpha.ca/myalliance/Default.aspx?cid=1599&lang=1) | | 2. Confirm authorized prescriber’s order and review procedure. | * A written order is a legal requirement. Orders written for intranasal medications must be written out in full to prevent inadvertent administration via the IV or IM route. * Policies and procedures provide a framework for standard of care at the HPHA | | 3. Perform hand hygiene. | * Single most important means of infection prevention | | 4. Obtain and document an accurate patient weight in kilograms (kg). | * Intranasal fentaNYL dose is calculated according to patient’s weight. * Consult specific dosing protocol***:*** [*Intranasal fentaNYL for Management of Acute Pain*](https://intranet.hpha.ca/myalliance/doc.aspx?id=6131) for dose limits | | 5. Assess the patient for specific contraindications to receiving the intranasal medication and advise the physician accordingly. | * See ***Considerations*** heading above. * The ordering physician should be consulted before administration if any potential contraindications. | | 6. Perform hand hygiene and don gloves | * Single most important means of infection prevention | | 7. Inspect patient’s nostrils for significant amounts of blood, mucous or discharge. If present, the nasal passage should be suctioned prior to administration of intranasal drugs | * Presence of large amount of discharge or blood may limit medication absorption. | | 8. If necessary and if procedure pertains to a child, appropriately secure and stabilize the child prior to administering medication. | * Ensures patient safety and prevent accidental dislodgement of MAD**®** device during administration*.* | | 9. Determine the appropriate medication dose per protocol and prescriber order. The extra 0.1 mL of medication is included in the protocol charts accounting for the dead space in theMAD**®**device | * There is a dead space within the delivery device leading to some of the drug remaining within the device and not being delivered to the patient | | 10. Draw up prescribed amount of medication solution using the most concentrated form of the medication available into a 1 mL or 3 mL syringe using an appropriate transfer needle.  Eliminate any remaining air. Attach the mucosal atomization device (MAD®) to the end of the syringe. | * Consult specific dosing protocol: Intranasal fentaNYL for Management of Acute Pain for dose limits | | 11. Perform an independent double check of dose with a nurse or physician. | * Adhere to the 6 rights of medication safety: right medication, right dose, right time, right route, right patient and right documentation to ensure patient quality and safety | | 12. Obtain baseline vital signs, and age appropriate and pain score. Place patient on a continuous oxygen saturation, BP, Pulse and ECG monitor. Assess and monitor the level of consciousness, conscious sedation scores | * Pain and sedation scores and vital signs should be done prior to medication administration as a baseline to monitor patient’s response to medication. * Patient should be awake or easily roused to voice prior to each dose. | | 13. Position patient in a supine or recumbent position |  | | 14. Holding the occiput or crown of the head stable, place the tip of the MAD**®** snugly against the nostril. Stop once resistance is met. Aim the syringe slightly up and outward (toward the top of the ear) to cover the turbinates and olfactory mucosa. | * To ensure maximum absorption to cover turbinates and olfactory mucosa | | 15. If exceeding the maximum volume of medication allowed per nostril, the volume should be halved in each nostril. | * Splitting the dose doubles the available mucosal surface area for drug absorption and increases the rate and amount of absorption. | | 16. Compress the syringe plunger rapidly and forcefully to expel the medication as a mist into the nostril. | * Misting optimizes absorption of the medication and reduces run-off down the throat. | | 17. After the dose has been delivered, hold the device in the nostril for 5 to 10 seconds to ensure absorption | * To prevent run off of medication | | 18. Provide encouragement and reassurance during the procedure as patients may cough and gag during administration. | * Strengthens the nurse-patient relationship and a positive patient experience. | | 19. Offer the patient a tissue to blot a runny nose or wipe nares of any excess drainage. Instruct the patient not to blow his or her nose for several minutes. | * Not blowing the nose ensures maximum medication absorption. | | 20. Remove PPE and perform hand hygiene. | * Performing hand hygiene constitutes the single most important means of infection prevention | | 21. Assess patient for side effects and medication effectiveness. | * Most common local adverse effects are nasal irritation or burning; some patients may report a ‘taste’ in their mouth.   **Other Side Effects:**   * Hypotension * Bradycardia * Respiratory depression * Nausea/vomiting * Dizziness * Sedation * Confusion * Headache | | 22. Vital signs, pain scores, oxygen saturation rates and conscious sedation scores should be checked every 5 minutes for 4 times and then every 15 minutes until return to baseline values and patient is stable for discharge or transfer as determined by the physician. | * Monitors effectiveness of FentaNYL for pain management and ensures close monitoring of the patient. | | 23. If patient is sedated or has abnormal vital signs, inform treating physician and continue observations and conscious sedation scores until a return to baseline. | * Monitors effectiveness of FentaNYL for pain management and ensures close monitoring of the patient for side effects. | | 24. Document all care and medication dose(s) given; and evaluate the effectiveness of the drug delivery and record any adverse reactions. | * Nursing documentation is an important component of nursing practice. * Maintains a legal record and communication with the healthcare team. | | 25. When providing intranasal medication, an IV should be established as soon as possible after medication is given | * To provide a route for additional medication if needed or if desired effect has not been achieved with intranasal administration | | 26. Doses may be repeated as ordered and with consideration of the protocol. | * Consult specific dosing protocol**:** [Intranasal fentaNYL for Management of Acute Pain](https://intranet.hpha.ca/myalliance/doc.aspx?id=6131) for dose limits | | **HPHA Related Documents**  Dosing protocol:[Intranasal fentaNYL for Management of Acute Pain](https://intranet.hpha.ca/myalliance/doc.aspx?id=6131) | | | **References:**   |  |  | | --- | --- | | Borland M, Jacobs I, King B et al. (2007). A Randomized Controlled Trial Comparing Intranasal FentaNYL to Intravenous Morphine for Managing Acute Pain in Children in the Emergency Department.*Ann Emerg Med.49*(3):335-340  Collopy KT, Snyder S. Intranasal Drug Administration: An Innovative Approach to Traditional Care. Emsworld.com May 2011: 45-50.   |  | | --- | |  |   Elsevier. (2016). Medication Administration: Intranasal Medication (Pediatric). Retrieved from<http://lms.elsevierperformancemanager.com/ContentArea/NursingSkills/GetNursingSkillsDetails?skillid=CCP_161&skillkeyid=893&searchTerm=intranasal&searchContext=nursingskills>  Knoester, P.D., Jonker, D.M., Van Der Hoeven, R.T. et al (2002). Pharmacokinetics and pharmacodynamics of midazolam administered as a concentrated intranasal spray. A study in healthy volunteers.*British Journal of Clinical Pharmacology, 53,*501-507.  Lau, E. (Ed). (2012-2013). SickKids Drug Handbook and Formulary. United States: Lexicomp  Lexicomp:<http://www.lexi.com/individuals/nursing/>  Our Lady’s Children’s Hospital Crumlin. (2016). Guideline on the Delivery of Intranasal Medication using MAD (Mucosal Atomiser Device). Retrieved on June 20th from <http://www.olchc.ie/Healthcare-Professionals/Nursing-Practice-Guidelines/Intranasal-Medication-using-Muscosal-Atomiser-Device-MAD-Oct-2016.pdf>  Teleflex. (2013). Using the LMA® MAD Nasal™ Intranasal Mucosal Atomization Device. Retrieved from<http://www.teleflex.com/usa/product-areas/ems/intranasal-drug-delivery/mad-nasal-atomization-device/AN_ATM_MAD-Nasal-Usage_Guide_AI_2012-1528.pdf>  MCH Intranasal FentaNYL Policy. (2011)  Mudd S. (2011). Intranasal FentaNYL for Pain Management in Children: A Systematic Review of the Literature.*Journal of Pediatric Health Care*,*25*:316-322  The Ottawa Hospital. (2018). Parenteral Drug Therapy Manual (39th.ed).  The Royal Children's Hospital Melbourne Intranasal FentaNYL Guideline, 2013  Walbergh, E., Willis, R., & Eckert, J. Plasma concentrations of Midazolam in children following intranasal administration.*Anesthesiology,*1991;*74*: 233-235.  Wermeling DP. Intranasal Delivery of Antiepileptic Medications for Treatment of Seizures.*Neurotherapeutics*2009; 6(2):352-358  Wolfe, Tim, M.D. (2013) Therapeutic intranasal drug delivery: Needless treatment options for medical problems.<http://intranasal.net/information_links/default.htm>  Wolfe TR & Macfarlane TC. (2005). Intranasal midazolam therapy for pediatric status epilepticus.*American Journal of Emergency Medicine,24*:343-346 | | | |

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| |  |  |  | | --- | --- | --- | | **Huron Perth Healthcare Alliance** | | | | **1. Clinical Policies and Procedures** | Original Issue Date: | June 07, 2017 | | **Medication - Intranasal Midazolam Delivery** | Review/Effective Date: | July 11, 2019 | | **Approved By: VP People and Chief Quality Executive** | Next Review Date: | July 11, 2021 | |
| https://intranet.hpha.ca/myalliance/imgs/spacer.gif |
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The corresponding approved dosing protocol: [**Intranasal Midazolam for Treatment of Seizure Activity**](https://intranet.hpha.ca/myalliance/doc.aspx?id=6132) shall be followed. | | **Purpose**  The purpose of this policy is to provide a guideline for the safe administration of intranasal Midazolam with the use of a Mucosal Atomization Device (MAD). It is expected that all staff shall adhere to the principles outlined in this policy. | | **DEFINITIONS:**  Mucosal Atomization Device (MAD) - consists of a soft foam conical applicator containing a plastic aerosolizer attached to a syringe. When the syringe plunger is compressed, the medication in the syringe is pushed through the aerosolizer and converted into a mist. | | **Indications:**  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. Intranasal Midazolam is indicated upon physician order for treatment of persistent seizure activity in patients older than 1 month of age to adults who do not have IV access. | | **Contraindications** to administering intranasal Midazolam include known allergy/sensitivity to the drug, as well as conditions which would impair intranasal drug absorption such as:   * Facial trauma involving the nose * Bilateral blocked nasal passages such as severe nasal congestion or dischargeNasal mucosal erosion * Epistaxis * Concomitant use of intranasal vasoconstricting drugs (e.g. decongestants or cocaine) which can inhibit absorption of intranasal medications   Use intranasal Midazolam with caution in patients:   * who have recently been administered sedatives or opioids; * who have an altered level of consciousness; * with myasthenia gravis * with acute angle-closure glaucoma * with respiratory disease (i.e. COPD) * with heart failure   **For administration of intranasal medications:**  The **maximum volume** of medication administered **per nostril** is:   |  |  | | --- | --- | | Neonates and Infants up to 12 months of age | 0.5 mL per nostril | | Children over 12 months old | 1 mL per nostril | | Adults | 1 mL per nostril |  * Larger volumes are not reliably absorbed due to saturation of mucosal surface and drug loss in the oropharynx. * Nasal administration does not always work for every patient as absorption can be erratic. | | **Competency Requirements:**  A Registered Nurse having had the appropriate theoretical preparation for and understanding of the underlying condition for which this treatment is proposed may perform this treatment on the order of a physician.  Prior to initiating any of the interventions outlined in this policy, nurses must have the knowledge, skill and ability to identify associated risks and precautions, manage potential adverse reactions and provide ongoing assessment and monitoring of the patient prior to, during and post intranasal Midazolam administration.  The Nurse will:   * Review the HPHA policy Medication Administration - Intranasal Midazolam Delivery * Review the associated HPHA approved dosing protocol:[Intranasal Midazolam for Treatment of Seizure Activity](https://intranet.hpha.ca/myalliance/doc.aspx?id=6132" \t "_blank). * Annually self-assess their competency to administer intranasal Midazolam, take appropriate measures to ensure competency is maintained and retain a record of related learning activities as per CNO practice standards.   **Procedure Chart:** | |  |  |  | | --- | --- | | **Procedure** | **Rationale** | | **Equipment:**   * Either a 3mL syringe or 1mL syringe with removable MAD**®** device * Blunt Needle * Gloves * Tissue * Personal protective equipment (PPE) as appropriate if patient under isolation precautions. * Midazolam as determined by HPHA dosing protocol:[Intranasal Midazolam for Treatment of Seizure Activity](https://intranet.hpha.ca/myalliance/doc.aspx?id=6132) | Mucosal atomization device (MAD) | | **The following steps shall be followed:** | | | 1. Verify the patient’s identity using two forms of identification | * Patient safety precaution. * Refer to HPHA [Patient Identification Policy](https://intranet.hpha.ca/myalliance/Default.aspx?cid=1599&lang=1) | | 2. Confirm authorized prescriber’s order and review the procedure. | * A written order is a legal requirement. Orders written for intranasal medications must be written out in full to prevent inadvertent administration via the IV or IM route. * Policies and procedures provide a framework for standard of care at HPHA | | 3. Perform hand hygiene. | * Single most important means of infection prevention | | 4. Obtain and document an accurate patient weight in kilograms (kg). | * Intranasal Midazolam dose is calculated according to patient’s weight· Consult specific dosing protocol**:**[Intranasal Midazolam for Treatment of Seizure Activity](https://intranet.hpha.ca/myalliance/doc.aspx?id=6132) | | 5. Assess the patient for specific contraindications to receiving the intranasal medication and advise the physician accordingly.  . | * See **Considerations**heading above. * The ordering physician should be consulted before administration with any potential contraindications. | | 6. Perform hand hygiene and don gloves. |  | | 7. Inspect patient’s nostrils for significant amounts of blood, mucous or discharge. If present, the nasal passage should be suctioned prior to administration of intranasal drugs. | * Presence of large amount of discharge or blood may limit medication absorption. | | 8. If necessary and if procedure pertains to a child, appropriately secure and stabilize prior to administering medication if necessary. | * Ensures patient safety and prevent accidental dislodgement of MAD® device during administration*.* | | 9. Determine the appropriate medication dose per protocol and prescriber order. The extra 0.1 mL of medication is included in the protocol charts accounting for the dead space in the MAD® device. | * There is a dead space within the delivery device you use leading to some of the drug remaining within the device and not being delivered to the patient | | 10. Draw up prescribed amount of medication solution using the most concentrated form of the medication available into a 1 mL or 3 mL syringe using an appropriate transfer needle.  Eliminate any remaining air. Attach the mucosal atomization device (MAD®) to the end of the syringe. | * Consult specific dosing protocol:[Intranasal Midazolam for Treatment of Seizure Activity](https://intranet.hpha.ca/myalliance/doc.aspx?id=6132) | | 11. Perform an independent double check of dose with a nurse or physician. | * Adhere to the 8 rights of medication safety: right medication, right dose, right time, right route, right frequency, right reason, right patient and right documentation to ensure patient quality and safety | | 12. Obtain baseline vital signs. Place patient on a continuous oxygen saturation, BP, Pulse and ECG monitor. Assess and monitor the level of consciousness, conscious sedation scores and pain scores | * Pain and sedation scores and vital signs should be done prior to medication administration as a baseline to monitor patient’s response to medication | | 13. Position patient in a supine or semi-reclined position. |  | | 14. Holding the occiput or crown of the head stable, place the tip of the MAD**®** snugly against the nostril. Stop once resistance is met. Aim the syringe slightly up and outward (toward the top of the ear). | * To ensure maximum absorption to cover turbinates and olfactory mucosa. | | 15. If exceeding the maximum volume of medication allowed per nostril, the volume should be halved in each nostril. | * Splitting the dose doubles the available mucosal surface area for drug absorption and increases the rate and amount of absorption. | | 16. Compress the syringe plunger rapidly and forcefully to expel the medication as a mist into the nostril. | * Misting optimizes absorption of the medication and reduces run-off down the throat. | | 17. After the dose has been delivered, hold the device in the nostril for 5 to 10 seconds to ensure absorption | * To prevent run off of medication | | 18. Provide encouragement and reassurance during the procedure. | * Strengthens the nurse-patient relationship and a positive patient experience. | | 19. Offer the patient a tissue to blot a runny nose or wipe nares of any excess drainage. Instruct the patient not to blow his or her nose for several minutes | * Not blowing the nose ensures maximum medication absorption. | | 20. Remove PPE and perform hand hygiene. | * Performing hand hygiene constitutes the single most important means of infection prevention | | 21. Assess patient for side effects and medication effectiveness. | * Most common local adverse effects are nasal irritation or burning; some patients may report a ‘taste’ in their mouth.   **Other Side Effects:**   * Drowsiness * Excessive sedation * Confusion * Dizziness * Respiratory depression * Hypotension * Bradycardia/bradyarrhythmia * Nausea and vomiting * Cough | | 22. Vital signs, pain scores, oxygen saturation rates and conscious sedation scores should be checked every 5 minutes for 4 times and then every 15 minutes until return to baseline values and patient is stable for discharge or transfer as determined by the physician. | * Monitors effectiveness of Midazolam and ensures close monitoring of the patient. | | 23. If patient is sedated or has abnormal vital signs, inform treating physician and continue observations and conscious sedation scores until a return to baseline. | * Monitors effectiveness of Midazolam and ensures close monitoring of the patient for side effects. | | 24. Document all care and medication dose(s) given; and evaluate the effectiveness of the drug delivery and record any adverse reactions. | * Nursing documentation is an important component of nursing practice and maintains a legal record and communication with the healthcare team. | | 25. When providing intranasal medication, an IV should be established as soon as possible after the medication is given | * To provide a route for additional medication if needed or if desired effect has not been achieved with intranasal administration | | 26. Doses may be repeated as ordered with consideration of the protocol. | * Consult specific dosing protocol**:**[Intranasal Midazolam for Treatment of Seizure Activity](https://intranet.hpha.ca/myalliance/doc.aspx?id=6132) | | **HPHA Related Documents**  Consult specific dosing protocol:[Intranasal Midazolam for Treatment of Seizure Activity](https://intranet.hpha.ca/myalliance/doc.aspx?id=6132) | | | **REFERENCES:**   |  |  | | --- | --- | | BC Children’s Hospital. (2015). Guidelines for the Administration of Intranasal Midazolam. Retrieved from <http://policyandorders.cw.bc.ca/resource-gallery/Documents/BC%20Children's%20Hospital/CM.04.25%20Guidelines%20for%20the%20Administration%20of%20Intranasal%20Midazolam.pdf>  Borland M, Jacobs I, King B et al. (2007). A Randomized Controlled Trial Comparing Intranasal Fentanyl to Intravenous Morphine for Managing Acute Pain in Children in the Emergency Department.*Ann Emerg Med.49*(3):335-340   |  | | --- | | Collopy KT, Snyder S. Intranasal Drug Administration: An Innovative Approach to Traditional Care. Emsworld.com May 2011: 45-50. |   Elsevier. (2016). Medication Administration: Intranasal Medication (Pediatric). Retrieved from<http://lms.elsevierperformancemanager.com/ContentArea/NursingSkills/GetNursingSkillsDetails?skillid=CCP_161&skillkeyid=893&searchTerm=intranasal&searchContext=nursingskills>  Knoester, P.D., Jonker, D.M., Van Der Hoeven, R.T. et al (2002). Pharmacokinetics and pharmacodynamics of midazolam administered as a concentrated intranasal spray. A study in healthy volunteers.*British Journal of Clinical Pharmacology, 53,*501-507.  Lau, E. (Ed). (2012-2013). SickKids Drug Handbook and Formulary. United States: Lexicomp  Lexicomp:<http://www.lexi.com/individuals/nursing/>  Our Lady’s Children’s Hospital Crumlin. (2016). Guideline on the Delivery of Intranasal Medication using MAD (Mucosal Atomiser Device). Retrieved on June 20th from <http://www.olchc.ie/Healthcare-Professionals/Nursing-Practice-Guidelines/Intranasal-Medication-using-Muscosal-Atomiser-Device-MAD-Oct-2016.pdf>  Teleflex. (2013). Using the LMA® MAD Nasal™ Intranasal Mucosal Atomization Device. Retrieved from<http://www.teleflex.com/usa/product-areas/ems/intranasal-drug-delivery/mad-nasal-atomization-device/AN_ATM_MAD-Nasal-Usage_Guide_AI_2012-1528.pdf>  Teleflex. (2016). MAD Nasal™ Intranasal Mucosal Atomization Device. Retrieved from <https://www.teleflex.com/usa/product-areas/anesthesia/atomization/mad-nasal-device/AN_ATM_MAD-Nasal_User-Guide_AI_MC-001925.pdf>  The Ottawa Hospital. (2018). Parenteral Drug Therapy Manual (39th.ed).  MCH Intranasal Fentanyl Policy. (2011).  Mudd S. (2011). Intranasal Fentanyl for Pain Management in Children: A Systematic Review of the Literature.*Journal of Pediatric Health Care*,*25*:316-322  The Royal Children's Hospital Melbourne Intranasal Fentanyl Guideline, 2013  Walbergh, E., Willis, R., & Eckert, J. Plasma concentrations of Midazolam in children following intranasal administration.*Anesthesiology,*1991;*74*: 233-235.  Wermeling DP. Intranasal Delivery of Antiepileptic Medications for Treatment of Seizures.*Neurotherapeutics*2009; 6(2):352-358  Wolfe, Tim, M.D. (2013) Therapeutic intranasal drug delivery: Needless treatment options for medical problems.<http://intranasal.net/information_links/default.htm>  Wolfe TR & Macfarlane TC. (2005). Intranasal midazolam therapy for pediatric status epilepticus.*American Journal of Emergency Medicine,24*:343-346 | | | |