



# The Benefits and Applications of Nasal Sprays Treatments in Compounding Pharmacies

## A Practical Guide for Pharmacists

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**Husdon Polonini, BPharm MSc PhD**

One area of growing interest for compounding pharmacies nowadays is the use of nasal sprays as an effective and convenient route for drug delivery. For pharmacists working in compounding pharmacies across the U.S., understanding the intricacies of nasal spray formulations and their advantages is essential for optimizing patient outcomes.

### Advantages of Nasal Spray Delivery

Nasal sprays offer a unique method of administering medications due to the high vascularization of the nasal cavity, which allows for rapid absorption of active ingredients. Here are some key advantages of nasal spray delivery in the clinical setting:

1. **Fast Absorption:** Nasal drug delivery provides rapid absorption into the bloodstream, typically achieving therapeutic levels within 15 to 30 minutes.
2. **Avoidance of First-Pass Metabolism:** Medications delivered via the nasal route bypass the liver's first-pass metabolism, which is beneficial for drugs that are otherwise ineffective when taken orally due to metabolic transformation or degradation in the gastrointestinal tract.
3. **Direct Central Nervous System Access:** Certain drugs can directly access the central nervous system through the nose-to-brain pathway, bypassing the blood-brain barrier. This makes nasal sprays particularly advantageous for delivering neurological treatments.
4. **Convenience and Patient Adherence:** Nasal sprays are easy to self-administer, making them a practical choice for patients with difficulty swallowing (dysphagia) or those experiencing nausea and vomiting.

## Compounded Nasal Sprays: Applications and Customization

In compounding pharmacies, nasal sprays can be tailored to address specific patient needs, offering a broad range of therapeutic applications. Some common formulations include:

- **Hormone Replacement Therapy:** For patients needing hormone replacement therapy (HRT), nasal sprays offer an effective alternative to oral or transdermal routes. Compounded progesterone or estradiol nasal sprays are sometimes used with the added benefit of bypassing the digestive system.
- **Pain and Migraine Relief:** Lidocaine hydrochloride nasal spray is commonly compounded for the acute treatment of migraines. Its fast-acting nature and direct absorption make it an ideal solution for rapid pain relief.
- **Antioxidant and Detoxifying Agents:** Nasal sprays such as those containing L-glutathione offer antioxidant and detoxifying effects, particularly useful in treating conditions where systemic oxidative stress is a factor.
- **Respiratory and Sinus Conditions:** Nasal sprays are also widely used in treating respiratory ailments like allergic rhinitis, sinusitis, and other upper respiratory conditions. Compounded formulations can include corticosteroids, antihistamines, or bronchodilators.

## Challenges and Considerations in Nasal Spray Compounding

While nasal sprays offer many benefits, pharmacists must be mindful of potential challenges in their formulation and use:

- **Rapid Clearance and Short Retention Time:** The nasal cavity clears medications quickly due to mucociliary activity, meaning the window for drug absorption is limited. This can necessitate higher or more frequent dosing.
- **Volume Limitations:** The nasal cavity can only retain a small volume of liquid—typically between 25-200  $\mu$ L—before excess solution drains into the throat or is expelled. This limits the dosage per administration and can affect drug efficacy.
- **Irritation and Sensitivity:** Certain formulations or preservatives may cause irritation or discomfort in patients. The highly sensitive nasal mucosa requires gentle and well-tolerated excipients to minimize adverse effects.

## Practical Tips for Compounding Pharmacists

To ensure the successful formulation and use of nasal sprays in your compounding practice, consider the following:

1. **pH:** Maintaining the correct pH in nasal spray formulations is vital to prevent irritation and ensure patient comfort. The nasal mucosa is sensitive, and a pH range of 5.5-6.5 is generally recommended as it closely mirrors the natural pH of nasal secretions. This range minimizes the risk of causing discomfort, such as burning or stinging sensations, and protects the mucosal lining from irritation. However, in some cases, the active pharmaceutical ingredient (API) may require a formulation outside of this ideal pH range to maintain its stability. For instance, some APIs might degrade or become ineffective in a neutral pH environment and may require a more acidic or basic formulation. For example, peptides and proteins like insulin may require a slightly acidic environment (pH 4.0–5.5) to remain stable, whereas drugs such as atropine tend to be more stable in a slightly basic environment (pH 7.5–8.5). Additionally, certain antibiotics like vancomycin may require an acidic pH to maintain their stability and therapeutic effectiveness. In such situations, compounding pharmacists must weigh the need for API stability against the potential for mucosal irritation. Buffer systems can be employed to help maintain patient comfort even when pH adjustments are necessary, and excipients should be carefully chosen to mitigate adverse effects.

2. **Osmolarity:** Osmolarity is another critical aspect of nasal spray formulations that can impact patient comfort and drug efficacy. The goal is to make nasal sprays isotonic with nasal secretions, typically aiming for an osmolarity of 260 to 320 mOsm/kg, which corresponds to the osmotic balance naturally found in the nasal environment. Isotonic formulations minimize the risk of irritation, dryness, or swelling of the nasal mucosa and promote better patient adherence. However, there are clinical scenarios where a hypertonic or hypotonic formulation may be preferred. Hypertonic nasal sprays, which contain a higher concentration of solutes, are sometimes used to draw out excess fluid from congested nasal tissues. While effective for conditions such as sinusitis or rhinitis, these solutions can cause dryness or discomfort with prolonged use, so their application should be limited and closely monitored. Conversely, hypotonic solutions, which have a lower solute concentration, can enhance the absorption of the drug by promoting water influx into the cells of the nasal mucosa. While this can improve drug uptake, it may also lead to mucosal swelling or discomfort, particularly with repeated use. As such, pharmacists should carefully adjust the tonicity of nasal sprays based on the intended therapeutic use and patient tolerance.
3. **Proper Packaging and Calibration:** Nasal sprays should be dispensed in calibrated spray valve bottles to ensure accurate dosing. Over-spraying or under-spraying can lead to inconsistent therapeutic effects.
4. **Stability and Shelf Life:** Compounded nasal sprays typically have a shorter shelf life than commercial products. Preserved aqueous preparations may receive up to 35 days per USP <795> without further stability indicating testing.
5. **Patient Education:** Educating patients on the proper technique for administering nasal sprays is crucial to maximizing drug absorption. Make sure patients understand the importance of correct positioning, spraying technique, and storage.

## Conclusion

As the demand for personalized medication grows, nasal sprays represent an efficient and patient-friendly option for delivering a variety of therapeutic agents. From hormone replacement to pain management, compounding pharmacists can leverage the benefits of nasal sprays to enhance patient care. Understanding the specific challenges of nasal drug delivery—such as dosing, stability, and mucosal absorption—ensures that pharmacists can confidently prepare and dispense these formulations in their practices.

By focusing on individualized care and staying informed about advancements in nasal delivery systems, U.S. compounding pharmacies can continue to meet the unique needs of their patients with safe and effective solutions.

## Reference:

1. Ferreira, A., Polonini, H., Brandão, M.A. Guia Prático da Farmácia Magistral, 6th ed., 2023.

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