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Saline Nasal Irrigation for Upper Respiratory Conditions

Abstract

Acute and chronic upper respiratory conditions are common and expensive disorders with enormous impact on patient quality of life and society at large. Saline nasal irrigation (SNI), a therapy with roots in Ayurvedic medicine that bathes the nasal mucosa with in spray or liquid saline, has been used as adjunctive care for upper respiratory conditions. In liquid form, SNI has been found to be effective adjunctive care by the Cochrane Collaboration for symptoms associated with chronic rhinosinusitis. Less conclusive clinical trial evidence supports its use in spray and liquid forms as adjunctive treatment for mild-to-moderate allergic rhinitis and acute upper respiratory infections. Consensus or expert opinion recommendations exist for SNI as a treatment for a variety of other conditions including rhinitis of pregnancy. SNI appears safe; side effects are minimal and transient. It can be recommended by clinicians to interested patients with a range of upper respiratory conditions in the context of patient education and printed instructional handouts.

BACKGROUND AND HISTORY OF SALINE NASAL IRRIGATION (SNI)

Upper respiratory conditions, including acute and chronic rhinosinusitis, viral upper respiratory infection (URI) and allergic rhinitis, are common disorders with significant patient and societal impact. SNI is an adjunctive therapy for upper respiratory conditions which bathes the nasal cavity with saline delivered as a spray or liquid. SNI likely originated in the Ayurvedic medical tradition.¹ Several indications, solutions and administration devices for SNI were described in the *Lancet* in 1902.²

SNI has been identified as “an important component in the management of most sinonasal conditions [that is] effective and underutilized.”³ SNI can be performed using low positive pressure (spray or squirt bottle), or “gravity-based pressure (a vessel with a nasal spout) devices (Figure 1). Each is available OTC. Saline is instilled in one nostril and allowed to drain out the other. SNI use may be growing; it has received diverse media attention including the Oprah Winfrey Show (May 2007) and National Public Radio.⁴ Physician use of SNI is significant; in a survey of 330 Family Physicians, 87% reported recommending SNI to their patients for one or more conditions.⁵

Mechanism of Action

The exact mechanism of SNI action is not known. The breakdown of the nasal mucosa's protective function appears to play a role in upper respiratory conditions. SNI may enhance the nasal mucosa's ability to resist the effects of infectious agents, inflammatory mediators and irritants. SNI may result in improved function of the nasal mucosa through several reported physiological effects including the direct cleansing of irrigation,^{6–8} the removal of inflammatory mediators,^{9, 10} and improved mucociliary function, demonstrated by increased ciliary beat frequency.^{11, 12}

INDICATIONS AND EFFICACY

Chronic Rhinosinusitis

(*greater than 12 weeks*) is the most common indication for SNI according to a recent survey of physicians.⁵ Based on positive results in clinical and functional outcomes, the Cochrane Collaboration concluded that SNI is appropriate adjunctive therapy for the symptoms of

chronic rhinosinusitis.¹³ The strongest of the studies reviewed reported that subjects with chronic sinus symptoms using 2% liquid SNI daily plus routine care, compared to routine care alone, reported a 64% improvement in overall symptom severity, and significant and clinically relevant improvement in disease-specific quality of life at 6¹⁴ and 18 months.¹⁵ These results were corroborated for liquid, but not for nasal spray SNI.¹⁶ Users of liquid SNI also reported significantly decreased antibiotic and nasal spray use.¹⁴ Two studies evaluated the effect of liquid SNI on chronic rhinosinusitis in the context of workplace-related airborne irritants. Woodworkers (N=45), exposed to varying levels of wood dust, performed daily SNI and demonstrated significantly improved sinus symptoms, mucociliary clearance and expiratory nasal flow.¹⁷ Another similar study also reported positive findings.¹⁸

Viral URIs

Liquid and spray SNI has been evaluated for the treatment and prevention of viral URI. A Cochrane Collaboration systematic review is in progress.¹⁹ Two studies assessed SNI as a treatment for viral URI and reported conflicting results. In a 3-arm randomized controlled trial (RCT), 143 adults with viral URI received either hypertonic spray SNI, normal saline SNI or “no-treatment” (control group); neither SNI had a measurable effect on duration or severity of nasal symptoms compared to controls.²⁰ An RCT of 200 adults with viral URI showed that subjects treated with micronized saline, compared to liquid SNI, had improved rhinometric resistance, nasal volume, mucociliary transit time and symptom severity scores.²¹ Compliance rates with each therapy were not reported, limiting the conclusion of superiority of micronized over liquid SNI for URI. The outcome measures in each study were different, limiting comparability.

One RCT of 60 adults evaluated spray SNI as preventive therapy for viral URI.²² In this study, those receiving a preventive daily spray SNI reported significantly fewer episodes of URIs, shorter symptom duration and fewer days with nasal symptoms compared to those without a preventive SNI care.

Effects of daily SNI for acute URI were evaluated in a methodologically strong two-phase RCT of 390 children.²³ Children with URIs were randomized to receive either routine care plus isotonic SNI with either liquid or fine spray or routine care only (control), and followed for 3 weeks (treatment phase) and then an additional 9 weeks (prevention phase). In both phases, both SNI delivery groups equally and statistically outperformed controls on nasal secretion, obstruction and medication use assessments.

Allergic Rhinitis

Effects of mist, large molecule spray and liquid SNI on the concentration of inflammatory mediators in nasal secretions have been assessed in subjects with seasonal allergic rhinitis.¹⁰ Both liquid and large molecule spray forms of SNI significantly reduced the levels of histamine and leukotrienes. A small RCT assessed children with laboratory-confirmed, pollen-triggered rhinitis and reported that antihistamine medication plus liquid SNI therapy, compared to antihistamines alone, resulted in significant reduction of allergy symptom severity and antihistamine medication use.²⁴ Subjects with a history of allergic rhinitis spontaneously reported positive effects of liquid SNI on allergy symptoms.²⁵

Other Indications

Consensus guidelines consider SNI safe and possibly effective for mild-to-moderate rhinitis of pregnancy and acute rhinosinusitis,²⁶²⁷ though no clinical trials have assessed SNI for these indications. In a recent survey of family physicians who use SNI in their practices, 17% recommend SNI for rhinitis of pregnancy and 67% for acute rhinosinusitis.⁵ Content experts

have recommended SNI for postoperative care,²⁸ sinonasal sarcoid²⁹ and Wegener's granulomatosis³⁰ in the absence of clinical trials (Table 1).

CONTRAINDICATIONS, ADVERSE EVENTS OF SNI

SNI appears safe. No adverse events have been reported in any study evaluating SNI. Minor side effects are common, including a sense of discomfort and nervousness with the first use of liquid SNI.²⁵ Side effects noted by less than 10% of SNI users included self-limited ear fullness, stinging of the nasal mucosa and epistaxis (rare),^{14, 16, 31} that were ameliorated by technique modification and salinity adjustment,²⁵ and did not cause subjects to discontinue SNI.^{14, 16} One study has identified equal side effects in both spray and liquid SNI forms.¹⁶ Optimal salinity of SNI is not known; 0.9% to 3% saline solutions have been most often used. Optimal pH and temperature are likewise not known. Each is likely patient specific²⁵ and has been reported as safe within the ranges used in the cited studies. In the U.S., lukewarm tap water seems safe for saline preparation; use of sterile water or pre-mixed solution is recommended if potability is in doubt.

PRACTICAL USE OF SNI

Few interested patients with appropriate conditions would be considered inappropriate for a trial of SNI. Examples include patients with the potential to leak saline to unwanted tissue planes or spaces (e.g. incompletely healed facial trauma), neurological or musculoskeletal problems that could facilitate aspiration, or patients who otherwise cannot perform the procedure. SNI is appropriate, safe adjunctive treatment for symptoms associated with chronic rhinosinusitis. SNI may be effective adjunctive treatment for mild-to-moderate allergic rhinitis, rhinitis of pregnancy and viral URIs. SNI has not been evaluated for acute rhinosinusitis.

Educating Patients

SNI can be quickly and successfully recommended in primary care settings. Successful users of SNI have identified effective patient education including coached practice and handouts as key to SNI initiation and maintenance.²⁵ A website providing free evidence-based bilingual SNI handouts including a recipe for saline solution, instructions for use, trouble-shooting tips and links to audio and video teaching media is at: <http://www.fammed.wisc.edu/research/past-projects/nasal-irrigation>.

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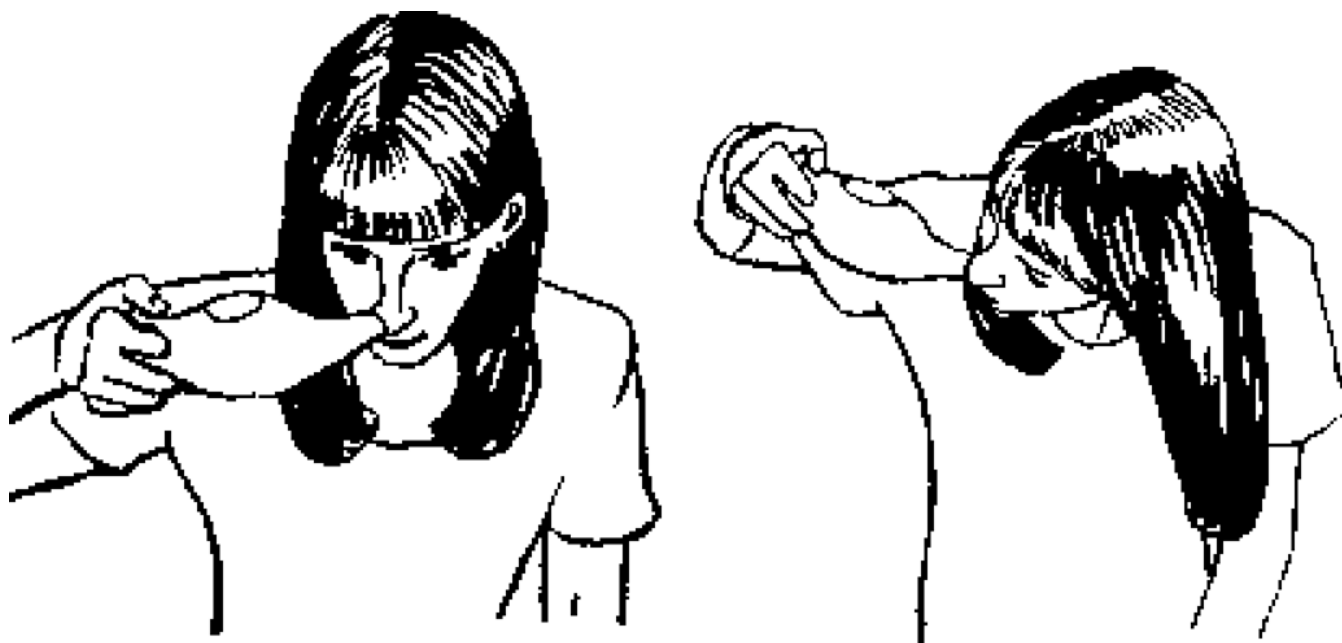


Figure 1.

A common nasal irrigation technique using a nasal cup, or neti pot. Liquid saline is instilled in one nostril and allowed to drain out the other.

Using Saline Nasal Irrigation for Chronic Sinus Symptoms

Chronic sinus symptoms (nasal congestion, runny nose or post nasal drip) are very common and have several potential causes and treatments. Saline nasal irrigation is a therapy you can do at home in addition to your current care plan for sinus symptoms. This technique improves symptoms by rinsing the area behind the nose with salt water. This handout describes how to perform SNI using a nasal cup, also known as a “neti pot”.

What you will need. A nasal cup and pre-packaged salt are commercially available at many pharmacies.

There are 3 steps to saline nasal irrigation.

Step 1: Mix the solution

If you are using a pre-packaged salt, simply prepare the salt water as indicated on the packaging using lukewarm water and put 4 fluid ounces (100 mL) in the nasal cup. If you plan to mix your own salt water using bulk ingredients, please see the website below for detailed instructions.

Step 2: Position the nasal cup (Please see pictures)

Lean over a sink so you are looking directly into the basin.

Rotate your head slightly and gently insert the spout of the nasal irrigation pot into the upper nostril so that it forms a comfortable seal. Do not press the spout against the “middle”, or septum, of the nose.

Step 3 Irrigate the nose

Breathing through your mouth, raise the nasal irrigation pot so that the solution enters the upper nostril. The solution will soon drain from the lower nostril.

When the nasal pot is empty, gently exhale through both nostrils to clear them of excess solution and mucus. Gently blow your nose into a tissue.

Repeat the procedure for the other nostril.

Nasal cup care

Mix new solution when you plan to irrigate your nose, discard extra salt water immediately.

Wash nasal pot after irrigation.

Troubleshooting

You may notice some drainage of salt water up to 30 minutes after nasal irrigation; this is normal. Many users of nasal irrigation carry tissues. If stinging or burning occur, try decreasing the salt content by half; you may also adjust the temperature of the water slightly. Do not use very hot or very cold water. Nasal irrigation can also be done in the shower.

Want more information? A more detailed patient handout, instructions for making and adjusting salt water using bulk ingredients, instructional videos and links, scientific reports and a radio story by National Public Radio (NPR) are at:

<http://www.fammed.wisc.edu/research/past-projects/nasal-irrigation>

Table 1

Recommended Indications for Saline Nasal irrigation

Key Clinical Recommendation	Evidence Rating	Reference
Nasal irrigation is effective adjunctive treatment for symptoms of chronic rhinosinusitis.	A	13,14
Nasal irrigation may be effective adjunctive treatment for symptoms of several other conditions based on limited trial evidence: Irritant Rhinitis/Congestion, Allergic Rhinitis, Viral upper respiratory congestion, Postoperative Care for endoscopic sinus surgery.	B	17,18,10,25,20,21,22,23,28
Nasal irrigation has been recommended by content experts for: mild to moderate Rhinitis of Pregnancy, Acute Rhinosinusitis, Sinonasal Sarcoid, Wegener's Granulomatosis.	C	26,27,29,30
Side effects: Nasal irrigation is associated with frequent, minor self-limited side effects that are ameliorated with practice or adjustment of procedure.	B	14,16,25,31

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, see page xxxx or <http://www.aafp.org/afpsort.xml>.