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# The prescribing patterns of Wisconsin family physicians surrounding saline nasal irrigation for upper respiratory conditions

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## Abstract

**Context—**Upper respiratory conditions are common and have a significant impact on patient quality of life, medical resource expenditure and antibiotic use. Saline nasal irrigation (SNI) is an adjunctive therapy for upper respiratory conditions; clinical studies suggest that use of SNI may be effective for symptoms upper respiratory conditions, and its popularity seems to be growing. The prescribing patterns of physicians regarding SNI have not been studied.

**Objective—**To assess the use among family physicians in Wisconsin of SNI, determine how and for which conditions they recommend SNI and the degree to which they experience clinical success with SNI.

**Design—**Electronic questionnaire

**Participants—**330 practicing family physicians in the Wisconsin Academy of Family Physicians and Wisconsin Research and Education Network

**Intervention/Outcome—**Not applicable

**Results—**Analysis showed that 286 of 330 respondents (87%) have used SNI as adjunctive care for a variety of upper respiratory conditions including chronic rhinosinusitis (91%), acute bacterial rhinosinusitis (67%), seasonal allergic rhinitis (66%), viral upper respiratory infection (59%), other allergic rhinitis (48%), irritant based congestion (48%) and rhinitis of pregnancy (17%). Respondents also reported having used SNI prior to antibiotics for acute bacterial rhinosinusitis (77%). Use

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The first two authors (DR and AZ) have the following conflicts of interest to report: Dr. Rabago has given one lecture to McNeil Consumer Healthcare on saline nasal irrigation; travel ($700) and an honorarium ($2000) were included. Dr. Zgierska is married to Dr. Rabago and as such meets “family relationship” criteria for potential conflict of interest, however she has no independent conflict of interest to report.

Dr. Peppard and Ms. Bamber have no conflicts of interest to report.

patterns varied regarding type of SNI administration, dosing frequency, saline concentration and patient education.

**Conclusions—**This questionnaire-based study suggests that SNI is used by family physicians for a variety of upper respiratory conditions though recommendation and patient education styles, dosing schedules, and solution types vary.

## INTRODUCTION

Upper respiratory conditions, including chronic and acute rhinosinusitis, viral upper respiratory infection (URI) and allergic rhinitis are common and expensive disorders that have a significant impact on patients, medical resources and society. Saline nasal irrigation (SNI), an adjunctive therapy for upper respiratory conditions, rinses the nasal cavity with saline delivered as a liquid or spray. The practice of SNI likely originated in the Ayurvedic medical tradition, in which it is known as "jala neti".[1] The Lancet published an early reference to SNI in 1902, describing several indications, solutions and administration devices.[2] SNI has been identified as "an important component in the management of most sinonasal conditions [that is] effective and underutilized."[3] It has been identified as appropriate adjunctive care (SORT Level A) [4] for chronic rhinosinusitis.[5] Evidence from clinical trials supports its use as adjunctive therapy for viral URIs and allergic rhinitis (SORT Level B). SNI has also been recommended for symptom alleviation in a number of other upper respiratory conditions (SORT Level C).[6]

While SNI has not been included in previous assessments of complementary and alternative use in the US,[7] SNI has recently received demographically diverse media attention in the U.S., including popular reports on the Oprah Winfrey Show (May 2007) and National Public Radio. [8] While the exact use prevalence is not known, SNI appears popular and this interest may be growing. A recent consumer survey of 100,000 households found that the percentage of households from March 2007 to March 2008 with a spray SNI device was 9% and that in the same period, the percentage of households with a liquid SNI device climbed from 0.6% in 2007 to 1.7% in 2008.[9]

Use of SNI for chronic sinus symptoms has been reported to improve patient quality of life and decrease both symptoms and sinus medication use including antibiotics.[10] Even a small decrease in the use of prescription and over-the-counter medications could have a substantial impact on medical expenditure, "antibiotic pressure" and associated antibiotic resistance. While use of SNI is supported by clinical trial data for some conditions and seems to be growing in popularity, the use patterns among physicians regarding SNI are unknown; no study has assessed the awareness or clinical use of SNI among practicing physicians. We therefore conducted an electronic survey study of family physicians in Wisconsin with the goal of better understanding the degree to which they are aware of SNI, how and for which conditions they recommend SNI, the degree to which they experience clinical success with SNI, and physician characteristics that might influence physician SNI-related practice patterns.

## METHODS

This study was approved by the University of Wisconsin School of Medicine and Public Health Institutional Review Board. Data for this study were gathered in June and July, 2007 using an electronic survey via the Zoomerang™ platform sent by email to family medicine physicians in Wisconsin.

### Subjects and Survey Mailings

The following criteria for physician eligibility were used: inclusion: 1) all practicing family physicians in the Wisconsin Academy of Family Physicians (WAFP; n=1695), or 2) all family

physicians who were members of the Wisconsin Research and Education Network (WREN; n=131), and exclusion: 3) those without an active email address. All eligible physicians were sent an announcement email, followed one week later by the survey. Up to 2 reminder emails were additionally sent over the course of 3 weeks if the survey was not returned. When inspected and corrected for duplication, invalid email address and ineligibility, a total of 313 (18.5%) subjects from the WAFP group and 17 (12.9%) subjects from the WREN group completed surveys. Analyses were conducted on the combined sample of 330 responding physicians.

### Questionnaire Design

The questionnaire was developed by the first author (DR) in collaboration with the coauthors and the WREN staff. It was additionally reviewed by four content experts in the University of Wisconsin-Madison Departments of Family Medicine and Otolaryngology, and modified according to their comments targeting survey content, readability and brevity. The electronic questionnaire required less than 5 minutes to complete and guided respondents through 8–24 items, depending on an individual's responses to items about awareness and current use of SNI. Physicians who indicated awareness of SNI were given several multiple-choice questions concerning the method and formulations of SNI used, the conditions for which they recommended SNI, and their estimate of the degree of patient satisfaction from SNI use.

### Analysis

SAS software (Version 9.1.3, SAS Institute, Inc., Cary, NC) was used to calculate descriptive statistics and proportions. Prevalence of physician use of SNI, and patterns of SNI recommendations (e.g., recommended for children and/or adults?, recommended prior to antibiotic use?; type of recommended SNI—spray, gravity or pressure-based?) were estimated in the whole sample of respondents and for physician subgroups defined by physician age, gender, years in practice, and practice location. Exact statistical methods were used to calculate p-values assessing the statistical significance (two-sided $p<0.05$) of differences in the prevalence of SNI awareness and practice patterns among physician subgroups.

## RESULTS

The sample consisted of 195 (59%) men, 296 (90%) Caucasian and had a balanced age distribution. Almost a half of physicians worked in a multi-specialty clinic (45%) in an urban environment (59%), and has been in practice 10 or fewer years (40%). Awareness and recommendation of SNI were very high, with 87% of respondents reporting that they currently recommend SNI. Only 8% stated being aware of but not recommending SNI, and 5% reporting lack of awareness of SNI. Among those familiar with SNI, most learned about this therapy through professional sources such as a colleague (69%), journal or conference (54%).

Table 1 summarizes the SNI-related practice patterns of physicians who responded as being aware of and actively recommending SNI to their patients. Most physicians were aware of all 3 different SNI formulations: spray (93%), liquid "gravity" (88%) and liquid "positive pressure" (72%). Spray (78%) and liquid "gravity" (72%) were the most frequently recommended SNI methods; liquid "positive pressure" SNI was the least common method used (49%). In the respondents' offices, patient education on the use of SNI was most commonly provided by the physicians themselves (79%). Nursing staff explained how to use the SNI in 10% of the offices only, while no instruction on use was reported by 18% of SNI prescribing physicians. Verbal instructions were the most common reported method of recommendation (90%), followed by a printed patient handout (50%). SNI was most commonly recommended when the symptoms were present, more than once daily (41%) or daily (20%), or as needed (27%). When asked about the salinity of the recommended liquid SNI solution, most physicians

answered: “as printed” in a handout (51%); 44% used 0.9% “normal” saline concentration, and only 5–6% recommended hypertonic saline solutions. Only 36% of respondents reported advising patients to adjust salinity and pH of the SNI solution to comfort.

Almost all physicians reported advising SNI therapy to adults (98%) and children over 7 years old (80%); only 26% recommended SNI to children under 7 years old (Table 2). The most common indication for SNI was chronic rhinosinusitis (91%). At least half of respondents also recommend SNI for acute bacterial rhinosinusitis (67%), seasonal allergic rhinitis (66%), viral URI (59%), irritant and non-seasonal allergic rhinitis (48%). Of note, 17% advised SNI for rhinitis of pregnancy and about 10% for URI-induced asthma and nasal polyposis. A majority of physicians (77%) recommended a trial of SNI prior to antibiotics for bacterial rhinosinusitis (Table 2). When asked to estimate the degree to which their patients had been satisfied with the SNI therapy, most respondents (48%) answered “I don’t know;” 34% reported that more than half, and 19% indicated that less than half of their patients were satisfied with SNI (Table 2).

We assessed whether physician age (less versus more than 45 years old), years in practice (less versus more than 10 years), gender or practice location played a role in physicians’ SNI-related practice patterns which included: awareness of SNI; recommendation of SNI in general, for adults, children, and prior to antibiotic therapy; and the use of different methods of SNI delivery (spray, liquid “gravity” and liquid “pressurized” SNI). While age did not influence awareness of SNI therapy, younger physicians tended to recommended SNI more frequently in general ($p=0.06$) and prior to antibiotic use in bacterial rhinosinusitis ($p=0.02$). Physicians practicing for less than 10 years were more likely to recommend SNI in general ($p=0.06$) and for children ($p=0.02$), and to advise liquid gravity-based SNI method ($p=0.03$) than those who practiced longer. Women were more likely to recommend SNI than men ($p=0.05$). Practice location did not predict differences in practice styles.

## DISCUSSION

This is the first study to assess the use of SNI, an adjunctive therapy for upper respiratory conditions, among family physicians in Wisconsin. Among 286 physicians who reported that they recommend SNI, over 90% did so for chronic rhinosinusitis, and over half for allergic and non-allergic rhinitis, acute bacterial rhinosinusitis and viral URI. Most respondents indicated that they had advised SNI use prior to antibiotics as a temporizing mechanism in bacterial rhinosinusitis. Most respondents tended to recommend spray and gravity-based methods more frequently than positive pressure systems (e.g. Water Pik™). Most physicians recommended SNI to adults and children over seven years old without the assistance of ancillary staff.

Though the return of 330 questionnaires of a possible 1826 (18%) is not particularly low for web-based email-recruited surveys, it is lower than we had hoped. We suspect that respondent physicians are more likely than all eligible physicians to be aware of SNI (that is, physicians aware of SNI may have been more likely to respond to a survey on that topic). Thus, the presented results likely reflect practice patterns and physician characteristics among physicians aware of SNI. The data are likely to be representative of Wisconsin family physicians generally who recommend SNI, given that most (78%) of Wisconsin family physicians are members of WAFP. (Personal communication, Larry Pheifer, WAFP)

The practice patterns reported are consistent with existing literature evaluating SNI. The Cochrane Collaboration concluded that SNI is appropriate adjunctive therapy for the symptoms of chronic rhinosinusitis, [5] including symptoms in the context of workplace-related airborne irritants.[11] [12] The methodologically strongest of the Cochrane-reviewed studies reported that subjects using daily liquid SNI of 2% saline solution, plus routine care for chronic sinus

symptoms reported significant and clinically relevant improvements on disease-specific quality of life questionnaires at 6 and 18 months compared to routine care alone. [10]13 Routine care in these studies included physician recommended measures such as decongestant sprays and antibiotics. In the same study, users of liquid SNI also reported significantly decreased antibiotic and nasal medication-spray use.[10]

SNI has been assessed for allergic rhinitis. Both liquid and spray forms of SNI have been shown to significantly reduce the levels of inflammatory mediators, histamine and leukotrienes.[14] A small, methodologically strong randomized controlled trial (RCT) assessed children with laboratory-confirmed, pollen-triggered rhinitis and reported that antihistamine medication plus liquid SNI therapy, compared to antihistamine alone, resulted in significant improvement in allergy symptom scores and reduction in antihistamine medication use.[15] Adult subjects with a history of allergic rhinitis who used SNI spontaneously reported positive effects of SNI on allergy symptoms.[16]

About half the physicians in our study reported using an educational handout, and that the physicians themselves made the recommendation and provided patient education. A qualitative study evaluating the components of successful liquid SNI use reported that written teaching materials are important components to subject success and compliance, but also indicated that the most important element of teaching was coached practice prior to SNI use; subjects indicated they might not have been successful using SNI without this experiential component. [16] It is unclear if the same would hold true for spray SNI.

Physicians reported no clear preference for either liquid or spray SNI for a given condition. Liquid and spray SNI have been evaluated for the treatment of viral URI. A Cochrane Collaboration systematic review is in progress.[17] Existing studies show conflicting results. A three-arm RCT of 143 adults with viral URI compared effects of hypertonic spray SNI, normal saline spray SNI, and “no-treatment” control. [18] Neither saline preparation had an effect on duration or severity of nasal symptoms compared to controls. An RCT of 200 adults with viral URI showed that subjects treated with micronized saline spray, compared to liquid SNI, improved inspiratory and expiratory rhinometric resistance, nasal volume, mucociliary transit time, and symptom scores.[19] Evidence suggests that both liquid and spray SNI may have a role in prevention of viral URI.[20]21

Our results also showed no clear use pattern regarding 1) optimal salinity, 2) pH and temperature of SNI solution, and 3) SNI dosing frequency. Saline solutions from 0.9% to 3% have been most often used in research and clinical settings, however the optimal parameters of SNI use for a given condition have not been rigorously assessed. Thirty-six percent of respondents indicated that they advise patients to self-adjust salinity, schedule and temperature to comfort, which is consistent with recommendation for successful SNI use by subjects in a qualitative study.[16]

## Limitations

This study has several limitations. Selection and response biases may have created a non-representative sample; for example, physicians who use or have strong opinions or substantial knowledge of SNI may have been more willing to respond, or more willing to respond positively, to the questionnaire than those who did not. The low response rate precluded assessment of the general awareness of SNI among all family practitioners in Wisconsin. The demographics of our sample likely resulted in slightly higher reported rates of SNI use compared to that of the overall WAFP membership. Respondents to our survey were more likely to be female (43% compared to 35%) and younger than 35 years old (18% compared to 9%).

Although SNI appears safe, respondents were not queried directly about perceived safety profile of SNI. No significant adverse events have been reported in any study evaluating SNI. Minor side effects seem common, including a transient discomfort and nervousness with the first use of liquid SNI.[16] Non-serious side effects noted by less than 10% of SNI users include self-limited ear fullness, stinging of the nasal mucosa and epistaxis (rare);[10, 22, 23] each can be ameliorated by modification of technique and adjustment of salinity.[16] Respondents were also not asked to differentiate between delivery methods (i.e., passive gravity versus positive pressure liquid forms) or between liquid and spray forms of SNI. These distinctions have not been well studied. Superior outcomes for liquid compared to spray SNI have been reported in one study of chronic sinus symptoms, with side effects reported equally for both forms.[23]

### Clinical and Research Implications

SNI is freqently used as adjunctive care for many common upper respiratory conditions in ways consistent with small but well designed trials suggesting efficacy of SNI for these conditions. SNI has the potential to make a substantial positive impact on the quality of life of patients, and medical resources and medication use. Additional research is warranted on SNI-related practice patterns among physicians in other specialties who likely recommend SNI including allergy, pediatrics, otolaryngology, obstetrics and internal medicine, as well as on the basic and clinical science of SNI.

## Conclusions

The findings of our study suggest that family physicians who recommended saline nasal irrigation did so for a variety of upper respiratory conditions using liquid and spray SNI forms, though patient education, solution composition and dosing schedules of SNI were inconsistent. When used for conditions that may have a bacterial cause, a majority of physicians reported having advised the use of SNI prior to antibiotics.

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**Table 1**

Awareness and procedural recommendations associated with aline nasal irrigation among physicians (n=313) who recommend (n=286) or are aware of but do not recommend (27) SNI.

| Parameter | Parameter value | Frequency | Percent |
|---|---|---|---|
| Learned about SNI from: | Conference | 170 | 59 |
| | Colleague | 217 | 76 |
| | Media | 18 | 6 |
| | Patient | 105 | 37 |
| Aware of SNI method: | Gravity | 252 | 88 |
| | Positive pressure | 206 | 72 |
| | Spray | 267 | 93 |
| Methods of SNI recommended | Gravity | 205 | 72 |
| | Positive pressure | 139 | 49 |
| | Spray | 222 | 78 |
| How is SNI recommended: | Print | 144 | 50 |
| | Verbal | 256 | 90 |
| | Other | 11 | 4 |
| | Missing | 2 | 1 |
| Who shows SNI method? | Physician | 225 | 79 |
| | Nurse/assistant | 29 | 10 |
| | No one | 51 | 18 |
| Frequency of SNI recommended | Daily | 17 | 6 |
| | Daily with symptoms | 56 | 20 |
| | More than once daily | 7 | 3 |
| | >Daily with symptoms | 116 | 41 |
| | As needed | 76 | 27 |
| | Other | 14 | 5 |
| Salinity of SNI recommended | 0.9% | 125 | 44 |
| | 2–3% | 14 | 5 |
| | >3% | 2 | 1 |
| | As printed | 147 | 51 |
| | Don't know | 70 | 25 |
| Advise adjust salt, pH to comfort: | Yes | 104 | 36 |
| | No | 182 | 64 |

Percentages are rounded to nearest whole number; percentages add to more than 100% in some cells because the item was multiple choice.

**Table 2**

Age spectrum, clinical spectrum and satisfaction associated with SNI [a] use

| Parameter | parameter value | Frequency | Percent |
|---|---|---|---|
| Age SNI recommended | child, <7 yr | 75 | 26 |
| | child, >7 yr | 229 | 80 |
| | adult | 279 | 98 |
| Conditions for which SNI recommended: | Acute bacterial rhinosinusitis | 192 | 67 |
| | Chronic rhinosinusitis | 259 | 91 |
| | Seasonal allergic rhinitis | 189 | 66 |
| | Other allergic rhinitis | 137 | 48 |
| | Nasal Polyposis | 32 | 11 |
| | URI-induced asthma [b] | 26 | 9 |
| | Viral upper respiratory infection | 170 | 59 |
| | Irritant based congestion | 138 | 48 |
| | Rhinitis of pregnancy | 49 | 17 |
| SNI ever prior to antibiotics | Yes | 220 | 77 |
| | No | 66 | 23 |
| Patients satisfied by SNI (%) | 0–25% | 27 | 9 |
| | 25–50% | 26 | 9 |
| | 50–75%[c] | 85 | 30 |
| | 75–100% | 11 | 4 |
| | don't know | 137 | 48 |

[a] SNI, saline nasal irrigation

[b] URI, upper respiratory infection

[c] includes “about 50%”

percentages are rounded to nearest whole number; percentages add to more than 100% in some cells because the item was multiple choice.