

Report on a Pilot Study into  
**The Effects of Saline Nasal Irrigation (SNI)  
Upon Nasal Symptoms in Woodworkers**

*By Swami B. Saraswati and Dr Steve Rabone.*

### **ABSTRACT**

#### **Aims**

1. To determine if SNI decreases prevalence and/or severity of nasal and general symptoms amongst woodworkers
2. To determine woodworkers' acceptability of SNI.
3. To determine the effects of SNI upon: snoring, predisposition to and recovery from colds, sense of smell, nasal airflow patterns, mouth breathing.
4. To discover: the participants' reasons for trialing SNI and attainment of these reasons; any unexpected benefits or side effects; personal experiences of the technique; problems in learning and performing the technique; usage patterns; usual location and times of nasal cleansing; time taken to perform; lifestyle impositions caused by the method; likelihood of longer term usage.

#### **Methods**

A group of 46 volunteer woodworkers were randomly divided into 2 groups. One group used the intervention technique twice daily for 8 weeks whilst the other group was the control. Groups were crossed-over after the 8 weeks. At 16 weeks all participants were free to choose to cease or continue usage of the technique for a further 12 months follow-up period. Self reporting questionnaires were filled in by all participants at the beginning, cross-over, and at the end of the follow-up periods of the trial.

#### **Results**

- 1) The procedure of SNI was shown to be significantly ( $p=0.0001$ ) associated with a perception of decreased nasal problems during both the cross-over period and the one year follow up period. Beneficial changes in other aspects of health and well being appeared to associated with the procedure but inconsistently.
- 2) Acceptability of the procedure indicates that 21 of the 46 subjects were still using the procedure regularly after 1 year. Additionally, perceived usefulness of SNI showed a favourable response with 34 subjects saying they found the procedure quite useful or very useful.
- 3) Data was weak and inconclusive on the effects of SNI upon snoring and its effects upon catching and recovering from colds. There was strong evidence for improvements in the sense of smell, gross nasal airflow, nasal airflow imbalances and reduction in mouth breathing.
- 4) Most participants attained their intentions for entering the study group. There was a high number (124) of unexpected benefits. Side effects were shown to be minimal and overcome by time and experience with the procedure. Nearly all subjects had favourable impressions prior to and after first learning the technique with some apprehension and difficulties showing up whilst first learning SNI. Overall satisfaction after 16 months was 90%. Difficulties with the technique at some stage were reported by between 30 and 54% of users. Average usage of the practice varied from a high frequency of 10.8 times weekly at the beginning to a low of 2.8 times weekly by the end of the trial. When optional, 57% of the subjects adopted regular use, 28% as needed and 15% not at all. Usual location of nasal cleansing was at home for 95% of users. The average time taken to perform SNI was 4.3 minutes. 87 – 97% of users found the technique to be of no inconvenience to their usual lifestyle. Intention of usage beyond the 16 month study period was 41% on a regular basis, 30% on a need to basis, 29% not at all.

#### **Summary & Conclusions**

(Rabone) The study provides reasonable evidence that SNI significantly improves nasal symptoms in volunteer woodworkers. It shows that most woodworkers who wish to try the procedure will regard it is a useful aid and will adopt the technique with varying usage according to their own needs.

(Saraswati) The study also gives indications of SNI's potential usefulness in other areas of health and well being. The effects of SNI upon wood dust in woodworkers should be the starting point from which to explore the wider ramifications of a clean and well functioning nasal system.

## THE RESEARCHERS

Swami Bhavchaitanya Saraswati is a yoga teacher and yoga therapist of some 15 years experience. Over his years of teaching experience, he has noticed the health benefits gained by people who have been using a particular method of self-administered Saline Nasal Irrigation (SNI), well known by practitioners of the traditional yoga disciplines as a method of daily personal hygiene as well as an aid to meditation. The historical yoga texts; Swami's teacher's experience of some 50 years; his own personal experiences, observations and studies; as well as reports from other yoga teachers and students; all give weight to the anecdotal reports that regular practise of SNI can be a very effective method for both prevention and cure of many common upper respiratory ailments and their associated symptoms.

Swami believes that this particular technique should be investigated in a proper medical and scientific way, and that the findings of such trials should subsequently be presented to the broader community to encourage wider acceptance of the practice and also to find appropriate applications for it within public health management. He approached Dr Rabone for assistance in developing the first proper study of this kind upon SNI in Australia.

As a practising yoga therapist, he uses the methods of yoga for treating many common ailments. He has travelled the country extensively, giving lectures, seminars, workshops and residential retreats on many aspects of yogic science. He has produced a series of videos and cassette tapes on yoga and is the author of 5 books on Integral Yoga and associated topics. Although having no formal training in medical research, he has written several previous papers on SNI which include a 3 year survey on the effects of SNI on 200 yoga students in Western Sydney and rural NSW. He is the director of Nunyara Yoga Ashram near Wisemans Ferry NSW, where he currently resides and teaches.

Dr Steve Rabone is a medical practitioner who developed an interest in wood dust when working in research for Worksafe Australia (The Commonwealth Occupational Health and Safety Commission) between 1992 and 1996. Following surveys of the timber industry in Western Australia he became aware of the high prevalence of nasal symptoms amongst woodworkers. He was interested in exploring techniques to improve nasal symptoms amongst woodworkers. He is the author of published scientific papers on asthma detection and indoor air quality. Prior to Worksafe he worked in general rural practice for 10 years in the Riverland of South Australia and on the NSW far north coast. He graduated from Sydney University in 1974 with honours. His experience and counsel helped Swami Bhavchaitanya initiate this pilot study on SNI in woodworkers and to provide scientific analysis for some of its collected data.

## **INTRODUCTION & BACKGROUND**

(By Rabone)

Exposure to wood dust is associated with nose problems such as blocked nose, dry nose, runny nose, nose bleeds and sinusitis<sup>12</sup> as well as being suspected for other general ailments such as eye problems, snoring, headaches, tiredness, frequent colds, disturbed sleep patterns. Wood dust is also a Group 1 carcinogenic according to the criteria of the International Agency for Research on Cancer (IARC)<sup>3</sup> causing nasal adenocarcinoma. The proposed mechanism for carcinogenesis is based on the knowledge that wood dust contains many chemicals which have been demonstrated to be irritant, genotoxic and/or mutogenic<sup>4,5,6</sup> and that the dust in high concentration inhibits normal mucociliary clearance<sup>7,8</sup>. It is postulated that inhaled wood dust remains in the nose and then carcinogenesis occurs<sup>9,10</sup>. Exposure standards are based on the concentration of wood dust likely to cause mucostasis<sup>11,12</sup>, yet compliance with exposure standards and wearing of protective equipment is probably variable in many workplaces. In an unpublished survey of volunteers from the timber industry in Western Australia in 1993, one author found a high prevalence (25%) of self reported nasal symptoms amongst sawmill employees, variable exposures and variable use of personal protection. It is logically accepted that zero exposure to wood dust is the best way to prevent nasal symptoms and cancer. There is however little information about what measures are appropriate once exposure has occurred.

This study tested the hypotheses that cleansing of the nose using Saline Nasal Irrigation (SNI) will reduce nasal symptoms in wood workers. The process of cleansing the nose is directly analogous to cleaning dust and chemicals from the skin after work - a normal procedure to avoid skin irritation.

To test the hypothesis, this study trialed SNI in a group of wood workers. It asked whether the procedure of nasal irrigation affected the frequency and severity of nasal symptoms commonly experienced amongst groups of this type. It asked whether other aspects of health and well being were affected by the procedure. The trial asked for a measure of acceptability of the procedure by determining whether or not subjects would continue to use it beyond the initial compulsory phase.

If SNI proved to be acceptable, and if it was shown to be effective in relieving nasal irritation, then theoretical arguments could be constructed that it could be of use in the preventing nasal cancer. Removal of the carcinogenic should logically decrease cancer risk. The issue of nasal cancer could not, however, be directly assessed by this study.

## **THE HISTORY OF SNI (known as Jala Neti in the yoga tradition)**

(By Saraswati)

It could never be ascertained exactly how, when or where such a concept as saline nasal irrigation originated since as long as man has been living near the oceans and swimming in them, people would have realised the health giving attributes of sniffing saline water and vapours.

In the ancient yogic scriptures from the Indian sub-continent, as far back as 600 BC, mention is made of a method of nasal purification known as Sutra Neti. In the Hatha Yoga Pradipika it states - *"Neti removes diseases of the body in the regions above the shoulders. It purifies the region of the skull and makes the sight capable of seeing subtle things"*. Here the texts point to both its physical as well as meta-physical healing attributes.

The definition of Neti given in those times was the use of cotton threads or Sutras which were skilfully threaded in through the nasal passages and out of the mouth. The use of warm saline water (Jala Neti) was also adopted as an alternative method. It is known that even preceding such writings, these techniques had been passed on orally from guru to disciple in the traditional spiritual lineages. On other continents as well, evidence has been found of ancient civilisations which used

body cleansing rituals including SNI. The traditional medical systems of India, China, Europe, Africa and the Americas, have all used saline irrigation in a wide variety of ways for thousands of years.

More recently, in the western medical regimes of this century, SNI has been used in the otolaryngological profession (ear, nose & throat) upon patients.

Within the general populace, use of saline water is known as one of "grandma's old remedies" just for staying healthy in the head, throat and chest area. Saline gargling is also a part of these traditions. Often in our yoga classes, when we introduce the yogic method of SNI, people say that they have heard about, or actually perform themselves, a similar thing, by sniffing up salty water from their hand or a bowl. Many report that it gives them great protection and recovery from colds.

So, from all of the above, we see that neither the concept nor the practise of SNI is anything new, but rather, that it is both an ancient and universal practice and that it has a reputation with both medical and lay persons Eastern and Western for a range of health benefits. Surprisingly however, acceptance of the concept and practice of a nasal wash-out varies greatly in modern Western culture, with impressions ranging from "Yuk! That's absolutely disgusting" to "Oh yeah, that makes perfect sense".

## **AIMS OF THE STUDY**

The 2 researchers differed in their general approach to the study and therefore in the details of their aims and results. Each had different sets of questionnaires, with some cross-over of intention and results. Rabone narrowed the examination of the intervention technique to 2 main quantifiable occupational health issues.

1. To determine if SNI decreases prevalence and/or severity of nasal and general health symptoms amongst woodworkers
2. To determine woodworkers' acceptability of SNI.

Saraswati had, in addition to Rabone's aims, a broader focus. He wanted to test several other hypotheses relating to SNI and its effects on upper respiratory functions in general, and to possibly validate the anecdotal reports about its benefits on more subtle areas other than its effects on wood dust in the nostrils. Saraswati's questionnaires were more general and exploratory, and his analysis is more descriptive of responses rather than formulaic. He also aimed to entice interest in further research of SNI's possibilities beyond occupational health. These additional issues for investigation were:

3. To determine the effects of SNI upon: snoring, predisposition to and recovery from colds, sense of smell, nasal airflow patterns, mouth breathing.
4. To discover: the participants' reasons for trialing SNI and attainment of those reasons; unexpected benefits or side effects; personal experiences of the technique; problems in learning or performing the technique; usage patterns; usual location and times of nasal cleansing; time taken to perform; lifestyle impositions caused by the method; likelihood of longer term usage.

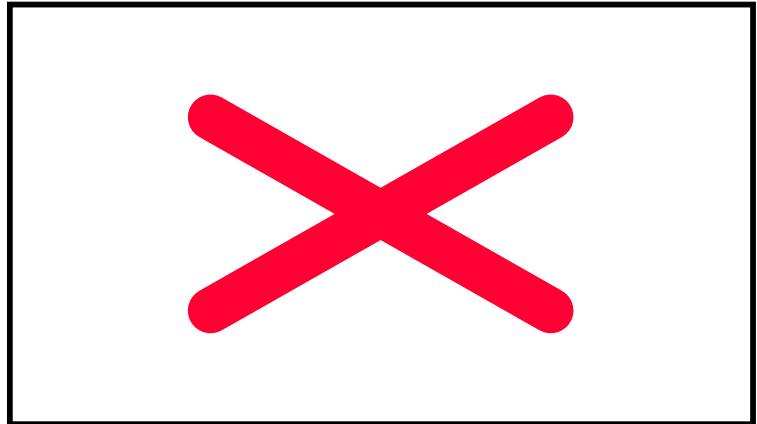
## **CHRONOLOGY**

Study Commenced	5th March 1996
8 week cross-over point	6th May 1996
End of 16 week cross over period	6th July 1996
12 month follow-up period	Commenced 6th July 1997 Completed 10th Dec 1997

## METHODS

### The Procedure of Saline Nasal Irrigation

A special, purpose-built pot, not unlike a small tea pot, is filled with warm, normal saline solution. A conical nozzle on the end of the spout is inserted into one nostril with enough pressure to seal and prevent water leakage. The angle of the head and pot is adjusted so that the water flows into one nostril, into the nasal passages and then out the other nostril. Half a pot is let flow in one direction and then the direction of the flow is reversed. Breathing is sustained through the mouth whilst water flows through the nose. After emptying the pot, the nose must be properly dried.



### Study Design

The study was designed by Rabone and Saraswati at Worksafe Australia including approval by Sydney University Ethics Committee. It was decided to be a randomised cross-over design with 2 months exposure to SNI and 2 months of no intervention. Due to the nature of the intervention technique, it was not possible for a placebo nor blinding to be considered in the design. There were to be 2 phases. A 16 week randomised cross-over period with twice daily application of the SNI intervention technique followed by a 12 month follow-up phase where usage was optional. Self reporting questionnaires were to be the method of measurement.

The final list of 46 volunteers was randomly divided into 2 groups of equal size. Appointments were made for all participants to attend the laboratory at Worksafe Australia to fill in questionnaires and for those in the first intervention group (Group 1) to be taught the technique of SNI. The intervention group were supplied free with stainless steel nasal cleansing pots, given all the relevant back up literature and sent home to perform the SNI technique twice daily for a period of 8 weeks. The first control group (Group 0) was instructed to continue their wood working activities in their usual manner with no intervention methods.

After 8 weeks, all participants were again called to appointments after which the groups crossed-over. The previous control group was instructed in the technique and supplied with the pots recovered from the previous intervention group (after sterilisation of course!). Questionnaires were collected again at this point.

At the end of 16 weeks all participants were again called to appointments, and questionnaires were again collected. From this point on, all participants were free to choose their own rate of usage of the technique (if at all). Those wishing to continue use of the technique were able to purchase their own nasal cleansing pot at their own expense (\$45). After 12 months, all participants were requested to attend appointments again where questionnaires were collected.

Measurements were performed by a series of questionnaires at the beginning (t=0), the cross-over point (t=8 weeks), end of the cross-over period (t=16 weeks) and 12 months later (t=68 weeks). Potential confounders included smoking habits, acute and chronic upper respiratory infection, other dust inhalation, drugs and medications that potentially affect nasal function and nasal allergy. If confounders were not able to be dealt with by the randomisation process they were to be adjusted for by using multivariate regression.

Analysis has been hampered by the low power of the study. To gain higher power would have entailed more participants and it was felt that too much was unknown about the methodology of SNI to commit larger resources to the project. Nevertheless it was decided that descriptive analysis of the responses coupled with formal statistical analysis would provide enough information to consider the potential of SNI.

### Selection of Participants

The researchers attended 3 meetings of NSW woodworking groups. These groups contained both full time and part-time wood workers. A presentation was given outlining current knowledge about the health effects of wood dust. A demonstration of the SNI procedure was given. The study design was explained and volunteers requested. 50 volunteers were obtained. Prior to commencement of the study, four volunteers withdrew. Thus 46 subjects commenced the study.

### Eligibility

To lessen possible confounding factors we excluded: those recovering from recent nasal surgery; those who has serous doubts about compliance; those who intended to dramatically change their work practices and location during the cross-over stage of the study.

### Characteristics of Participants

Sex: 42 male, 4 female  
Age: From 24 to 71 (mean 43)  
Alcohol: 17 did not drink alcohol  
29 drank less than 3 standard drinks per day.  
Smoking: 5 smokers  
23 ex smokers  
18 never smokers.  
Work Hours: 34 subjects worked greater than 10 hours per week  
10 worked 4 – 10 hours per week  
2 worked 1 – 4 hours per week.  
Exposure: 2.8 years on average potentially exposed to wood dust  
Workplace: Average dustiness of 44, where 100= “ultra clean” and 0= “the dustiest”.  
No general dust controls were used at work by 23 people  
wetting was used by 14  
extraction ventilation by 7  
fans by 3  
Protection: 16 used personal protection most of the time (from wood dust that is!)  
27 sometimes  
3 never  
Exercise: 24 reported 0 hours per week of sport or fitness activity  
6 reported 1 – 2 hours per week  
5 reported 2 – 4 hours per week  
11 reported greater than 4 hours per week.

### Data Collection

Questionnaires were all self-reporting, being posted out in advance of the appointments so as to be filled-in and then brought to each visit. Questionnaires obtained basic demographic data, records of SNI usage, measures of the perceived usefulness, and general comments. In most questions, recorded responses were on 0 – 100 linear scales with prompts written below the scales. Throughout the study, there were a considerable number of non-responses in the questionnaires. Being self reported and not checked through upon presentation, ambiguities and blank answers were not picked up until later. Some of the missing responses were gained by phone later and some could be

safely deduced from other answers given. Over the period of the study, with several participants becoming disinterested in responding, the number of questionnaires recovered diminished as in the following table.

Questionnaires (Total of 10)	A & 1	B	C & 2	D	E & 3	F & 4
Time (in weeks from t=0)	0	0	8	8	16	68
Number of questionnaires received	46	46	46	46	44	38

Where: (A, B, C, D, E, F) belong to Saraswati (1, 2, 3, 4) belong to Rabone

### Statistical Analysis

Formal statistical analysis was performed by Rabone upon his own 4 questionnaires as follows: Saraswati reports only the gross numerical responses and simple percentile figures as collected in his 6 questionnaires.

Analysis of crossover trial data was performed according to Armitage and Berry<sup>15</sup>. Analyses used two sample t-tests to test for SNI effect, period effects and period x SNI interaction. SNI x period interaction was assessed using control readings. (The t-tests indicated no detectable period effect or period interaction effect). To assess one year follow up changes, results were subtracted from control (0 months) results and the differences analysed using one sample t-tests.

Repeatability<sup>14</sup> of the questionnaire was estimated by subtracting results from the first response (prior to the study) from the responses after 2 months of not using SNI. Standard deviation of the measurement error ("s") was calculated as

$$s = \sqrt{(1/2n) \sum (x_1 - y_1)^2}$$

For nasal problems  $s = 16.0$ , mean = 9.0.

For eye problems  $s = 15.1$ , mean = 5.7

For general problems  $s = 12.8$ , mean = 3.8.

Results for all other variables in Table 1 were generally comparable with these.

## RESULTS - 1 & 2 (as per Rabone)

1. The procedure of SNI was shown to be significantly ( $p=0.0001$ ) associated with a perception of decreased nasal problems during both the cross-over period and the one year follow up period. Table 1 shows the mean perceptions for the 4 measurement periods as well as statistical significance of the changes.

Beneficial changes in other aspects of health and well being appeared to associated with the procedure but inconsistently (Table 1). There was lack of consistency between the cross over period and the follow up period as well as between some variables that ought to be similar (eg general health, general problems). Because of this, some results are difficult to interpret.

2. The trial asked for a measure of acceptability of the procedure. The reported usage at one year follow up is summarised in Table 2. These results indicate that 21 of the 46 subjects were still using the procedure regularly after 1 year. Additionally, one year follow up responses to perceived usefulness of SNI showed a favourable response (Figure 1) with 34 subjects saying they found the procedure quite useful or very useful.

Comments of the participants were requested on the questionnaires and these were not particularly focussed. They are presented in Table 3 as information about the group's experience with SNI.

## RESULTS – 1, 2, 3, 4 (as per Saraswati)

(1).....

Saraswati's data for nasal symptoms and general health benefits shows similar results to Rabone's but with less accuracy. In general terms, there were 37 reports of improved specific nasal symptoms by 49% (22) of the participants during their first 8 week usage period and 28 reports of further improvements by 26 subjects over the 12 month period.

These included: clearer nostrils, clearer head, better breathing, improved sense of smell, better sleep, discontinued nasal sprays, clearer sinuses, less nose bleeds, no colds, clearer head, better thinking, fresh & clean feeling, less sneezing, better sleep, more relaxed, peace of mind, well being. There were 3 negative effects reported: worsening of sinus, increased nasal blockage, cold symptoms. There were 4 reports of no effects.

(2).....

### Acceptability

Overall acceptability can best be gauged by a combination of the subjects' choices for using the procedure at 4 occasions during the trial.

- (i) Out of all the people addressed in the initial seminars, about 30% became volunteers for the study of which 38 (82%) were hoping to lessen nasal symptoms by doing so.
- (ii) In the short term (during the twice daily cross over period) overall average compliance was 77%, that is a total average for all subjects of 10.8 times per week ( $f = 10.8$ ). For exact distribution see Table 12.
- (iii) At the beginning of the optional 12 month phase, 39 out of the 46 subjects bought pots intending to be users. By the end of that period 32 (69%) were still using at some frequency, with 14 having stopped use. During that year, the overall weekly average usage dropped to  $f = 3.0$ . Details of usage patterns for the 12 months are shown in Table 14.
- (iv) When asked about their future intent beyond the 16 month study, 38 intended to use SNI again at some stage, 1 never again and 7 no responses. See Table 11.

If the intentions of remaining users can be believed (as in Table 11), it makes the total and overall perpetual acceptability for SNI:  $(71\% \text{ of } 30\%) = 21\%$  of woodworkers exposed to knowledge about the technique.

(3).....

### Snoring

1 subject reported their snoring had reduced after 8 weeks of usage

1 subject reported their snoring had ceased after 12 months of usage

1 subject reported their snoring had reduced after 12 months of usage

This reportage of snoring was made only incidentally in general comment and not by measurement scales over the whole group. Rabone's Table 1 shows better statistical significance based on his linear graph responses for the cross-over but not so the 12 month follow up.

### Predisposition to and recovery from colds

Such issues as these may seem extremely difficult to assess in just 8 - 16 weeks (irrespective of any particular climatic season) and may even be hard to show even after 1 year of season cycles. None the less, I felt that people's own medical history, compared with instinct and recent recollection could still give them a record for some amount of self assessment after 16 months of use.

Saraswati's responses on linear graph lines showed an overall average of 7.5% reduction in the number of colds contracted during the 16 week cross-over period with a further 8% improvement reported in the 12 month follow up.

An overall average of 3% better recovery from colds was reported during the 16 week cross-over period with 6% reported in the 12 month follow up.

Rabone's responses to this same symptom showed 4 improvements out of 44 in 8 weeks of usage and 7 out of 36 in 12 months.

These are small figures and there was a large variation between the groups which may make the results too inaccurate for evidence of any effect. In addition to the self assessment scale, there were comments made confidently by 4 people that they had definitely had less colds in 16 months since starting SNI.

To assess this reputed benefit of SNI more thoroughly, a study would need to involve people who have a very long history of regular colds, who performed the practice regularly for at least one year, and who had a lesser collection of confounding factors eg smoking, wood dust.

### Sense of Smell

Improvement reported in both groups was 25% and 23% overall in the short term with only a further small improvement over long term. However Rabone's figures showed 9 out of 36 improved in the 12 month period. Variations such as these were caused by different forms of questioning. Ecstatic comments such as "Hooray! I can smell again" and "I am enjoying the smell of breakfast again for the first time in many years" gave some indication of the unexpected pleasure arising from improved sense of smell. Details see Table 4.

### Nasal Airflow Blockages

Definite improvements were shown in the ability of SNI to improve nasal airflow. Blockages in nasal airflow would most likely be the first symptom noticed arising from excessive wood dust and should therefore be the most immediate and obvious factor showing improvement. One application of SNI can give immediate relief from nasal congestion lasting for many hours depending on the level of airborne particles or infectious causes. As a general question, without considering factors such as structural blockage, responses showed an improvement in both groups (60% and 52%) during their 8 weeks of intervention usage and a further 39% overall in the following 12 months. A definite worsening was shown in Gp 1 when the procedure was withdrawn after the usage period. Ecstatic comments such as "I can breathe again!" were common from many workers. Details see Table 5.

### Normalisation of Nasal Airflow Patterns

SNI is said to be able to restore and maintain the normal circadian rhythms of nostril airflow by removing non-structural blockages such as dirt particles and the build up of mucus. The hypothesis was explored that by clearing nasal airflow, normal circadian cycles of the nostril airflow could be restored in those who had imbalances in it. Yogis believe that (in a healthy individual) about every 90 mins, the predominance of nostril airflow will change. For about 4 minutes at the time of change over, there will be an even flow at the nostrils. Immediately after a session of SNI the nostril airflow

flow should, in a healthy person, be balanced for a far longer period of time, the length of which is dependent upon subsequent activity (such as food, work, relaxation, sleep) and environmental factors (such as temperature, humidity etc.) Since, in a healthy person, nostril airflows are seen to be properly fluctuating, and in unhealthy people these flows are more frequently imbalanced, the corollary follows that to restore normal airflow patterns by decreasing foreign particles, mucus and bacteria accumulated in the nose will therefore create better health.

Structural nasal problems such as deviated septum, polyps, along with lifestyle activities like use of nasal drugs, smoking, excessive alcohol and strong environmental pollutants present serious confounding factors for this question. It would have been preferred for each participant to have had a proper nasal examination prior to the trial to establish whether or not they had any structural nasal deformities. In responses, only 2 people mentioned these and thus we would expect less possibility of airflow normalisation in their cases. Others may not have known of such conditions or may have considered their condition not relevant to the study. From the data, it can be deduced that at least another 5 participants had such problems.

The results of Table 6 which asked the question “how often would you notice an imbalance in your nasal airflow?” show that during their 8 week intervention period overall 70% of respondents noticed an average 22% decrease in nasal airflow imbalance (an effect of unblocking one or more congested nostrils) and 63% recorded a further 22% decrease in the next 12 months.

Responses in Table 7 are the sum of data from the above question plus the question “which nostril predominantly has the lesser airflow?” to examine which subjects had normal, abnormal and fluctuating airflow rhythms. It shows that 16 people (35%) did not record abnormal circadian nasal airflow patterns; SNI appeared to make a positive change to 9 out of 46 people (20%); whilst 5 (11%) had a permanent one nostril blockage and 5 (11%) had a fluctuating nasal blockage upon which SNI appeared to make no noticeable difference.

Longer term monitoring of those people who noticed normalisation of nasal airflow patterns would, I believe, show an improvement in their upper respiratory health in particular, as well as in their general health. Much larger study numbers with proper examination would be required to prove more clearly such a hypothesis.

### Mouth Breathing

Similar to the previous question on nasal airflow imbalance, yogis maintain that to reduce mouth breathing, is to improve respiratory and general health. Responses to this question may not be wholly accurate since awareness of mouth breathing often takes some time (months) to establish. Responses can only be as accurate as one’s own self knowledge, so, for chronic mouth breathers, especially those working where strenuous activity demands high volume breathing, mouth breathing may not be seen as problematic and therefore awareness of mouth breathing would have been low prior to the study. Such an awareness is gained very quickly when SNI is undertaken since the cleanliness of the nose and its normalised function after a wash-out can be quite long lasting.

Table 8 shows improvements in the frequency of mouth breathing during each of the intervention periods with a worsening effect in Gp1 after ceasing the procedure. The groups showed a 16% and 13% lessening of mouth breathing during the 16 week cross-over period with both groups reporting no appreciable difference long term. These responses were obtained from a linear graph.

Responses in Table 9 give a stronger indication of perceived improvement (experienced over time) averaging 28% and 24%. These responses were obtained by pick-a-box “worse/same/better”.

(4).....

#### Reasons for Joining the Study

I was interested to know what motivates people into joining a medical research trial such as this where the intervention technique is untested and unusual and whether, after 16 months of trialing SNI, participants would consider they gained what they hoped to. The great majority (34/46) hoped to gain either relief from specific nasal ailments which they listed on their symptoms sheets or else general health gains. 8 kind souls volunteered to join the study, at least partly, for altruistic reasons of helping medical research and their fellow industry workers. Four were seriously concerned about the dangers of wood dust and hoped the study might reveal more about the likelihood of nasal cancer and indicate whether SNI might be a possible preventative method for nasal cancer.

#### Attainment of Reasons for Joining the Study

**Yes** - 33 participants out of all 46 had a combination of responses which indicated that their primary reason(s) for joining the study were in fact satisfied at some level. Of the 21 who started out with desires for improvement in specific nasal symptoms, all 21 of them (100%) were not disappointed in that they reported definite improvements in the symptoms they mentioned at the beginning of the trial. For the 14 who hoped for more general health benefits 11 (79%) reported gaining benefits along those same lines.

**No** - 5 did not report at any stage any perceived benefits from participation in the study and had not listed any benefits as having been gained.

**Maybe** - 8 participants either had stated desires or reasons for joining the study which were not attainable or quantifiable (eg to reduce the risk of nasal cancer and to help out medical research) or had benefits stated which were not comparable with their stated desires.

It may seem pointless to “study the study” but I was interested to assess whether people gained their primary reason for joining the study. Outcomes from this question could help the researchers to ascertain if participants had desires and expectations towards the technique and whether those expectations were realistic. It is also my aim to discover how people “take to” a technique such as SNI (that is - if their reasons for trying it are different to their satisfaction gained by it) and how their initial, intermediate and final attitudes to it change over time.

#### Unexpected benefits

In addition to the desired relief from certain symptoms listed at the beginning of the trial (n=52), many participants also reported additional unexpected or undesired benefits arising from use of the technique (n=124). Experience of SNI teachers has previously shown that in addition to obvious nasal therapy, there are many other tangential and indirect benefits which users find they have gained. The reports in this study seem to back this up. This may also indicate that the unexpected benefits are less subject to “imagined” outcomes and Hawthorn Effect.

#### Side effects

During the first 8 weeks of usage 34 users (74%) reported no adverse side effects at all with 12 users (26%) reporting a total of 16 minor difficulties with the procedure which are considered the usual “teething problems” associated with inexperience. 7 subjects chose not to buy pots to continue use after the cross over period, 4 stating their reasons as intolerable side effects with no noticeable benefits, 1 stating he used water from his hand just as effectively, 1 stating she would share a pot with her flatmate and 1 stating he was just too lazy to be bothered doing it for no noticeable benefits.

During the 12 month follow up period, only 1 user (out of 34 respondents) experienced only one negative side effect, possibly due to over use of the procedure. It can be deduced from other questionnaire responses that the 12 missing respondents therefore dropped out of usage due to either no benefits worth the effort (8) or intolerable negative side effects (4).

The side effects reported can be seen in Table 10 which shows the incidence of all reported difficulties experienced during the trial.

The issue of contra-indications for the procedure was not thoroughly dealt with in design of the study. I found close correlation between those who had chronic nasal problems (the usual contra-indications which require closer guidance); the incidence of difficulties experienced and the incidence of dropping out of usage. It is felt that medical history and likelihood of negative side effects are issues which need to be examined more closely in future trials of SNI so that data gained is more closely indicative of the average person's side effects or else can be related to specifically defined ailments and the effect of SNI upon them.

Personal experiences of the technique

Upon first hearing about it	92% of impressions were positive 5% of impressions were negative 2% of impressions were neutral
Approaching the first lesson	82% reported positive feelings 11% reported negative feelings (nervous) 7% reported neutral feelings
During the first lesson of SNI	43% reported positive experiences 39% reported neutral experiences 17% reported negative experiences
Straight after the first lesson in SNI	80% reported a positive experience 11% reported a neutral experience 9% reported a negative experience
After their first 8 weeks of usage	83% had an overall impression of SNI as positive
At the end of the 12 month period	90% rated their impression as positive

Whilst it can be seen that nearly all subjects were positive about the idea and theory of SNI, upon approaching the first lesson apprehension and “nerves” lessen that positivity. Problems arose for many during the first attempt but the immediate after effect was highly positive. Technical “teething problems” were solved in the first week at home and then the appreciation rate rose again with long term usage.

Problems or difficulties in learning or performing the technique

At the first lesson	21 (=46%) reported no difficulties at all
In their first week at home	32 (=70%) reported no difficulties at all
In the rest of the 8 week period	31 (=67%) reported no difficulties at all
During the next 12 months	30 (=65%) reported no difficulties at all

Table 10 shows the details of difficulties experienced at the different stages of the trial

The rate of difficulties experienced is highest at the beginning when first learning, lessening after a week or two and then remains fairly constant over time. This indicates that those users encountering problems with the technique are in fact encountering their own problems (ie structural nasal deformities and chronic mucus blockage). The types of difficulties reported are all very familiar to teachers of SNI. Any procedural problem has a simple solution and most users discover these solutions quickly, however, for some individuals, certain nasal pathologies are best excluded from the technique unless under close medical and yogic guidance. These are the users who have constant hassles with SNI and eventually give up on it.

### Usage patterns and reasons for changes

Intended and actual usage patterns were examined at each stage of the trial and are shown in Table 11. As can be expected of human nature intention and actual performance were somewhat different realities.

During the 16 week cross-over period when SNI was recommended twice daily, the average compliance rate for both groups was 77% which equates to an average weekly usage rate for the whole group of  $f = 10.8$ . See Table 12. Reasons for fluctuations in compliance during this period are in Table 13.

Following their first 8 weeks of usage, subjects were asked their intention for usage in the 12 month follow up. Their actual usage during the 12 month follow up when compliance was optional is in Table 14. Overall average weekly usage frequency by subjects still using at the end was  $f = 3.02$  or  $f = 2.3$  for all 46 subjects who had commenced the trial.

Over the 12 month period, usage by those (39) who had bought pots at the end of the cross-over period to continue usage was

- 23 (=57%) on a regular basis (greater than or equal to 3 x weekly)
- 11 (=28%) on an as needed basis (less than 3 x weekly)
- 6 (= 15%) not at all.

### Usual location of nasal cleansing

95% of users preferred place of performing SNI was at home. 26% of these worked at their home. Initially it was presumed that SNI users might perform the technique at a combination of their workplace and their home. It was assumed that the morning SNI would be done at home, and that some might then take their pot to and from work (if it was different to home) like their lunch pack, brief case or tool box and that the after-work cleansing might be done straight after exposure at the workplace. Due to the number of participants who worked at their home location (14 out of 46), and the impression that people prefer to keep their nasal cleansing for the domestic bathroom, very few workers (only 2 out of 46) ever performed SNI at the workplace – that is where it was different to the home place. A future scenario was envisaged where SNI might become a recommended occupational health routine, possibly sponsored by the employer, where workers would use SNI (their own pots of course, kept in their locker) in the bathroom at work before going home. Indications from this study seem to show that the technique is considered too personal and private to be used widely in the workplace and that transportation of the SNI pot between home and work would not be widely adopted.

### Usual Time of Performing SNI

The aim was to discover the times of day when SNI was performed following dusty work. There were such a high number of non-responses to this question rendering it useless for analysis. This was probably due to ambiguity of the question and also that users may have been inconsistent in their woodworking times and hence couldn't decide upon an accurate response.

### Time taken to perform

The average time taken to perform the procedure was 4.3 minutes. There was an enormous range of times reported (0.5 – 17.5 mins).. Possible reasons are as follows:

For users who stated that they take less than 3 minutes, it can be concluded that they may be:

- (i) underestimating the actual time taken
- (ii) only stating the time for water flow-through and not the mixing and drying processes
- (iii) not drying their nose properly in the instructed manner.

For users who take much longer than 5 minutes they may be:

- (i) overestimating the time taken
- (ii) having troubles getting the water to flow through due to mucus or structural blockage
- (iii) keeping the materials needed for the technique (pot, water, salt, basin) in different locations
- (iv) using several pots full of water to do a “double wash” due to an impression that they may not be totally cleansed in the nostrils after only one pot
- (v) having to repeat the drying process several times due to water left in the passages.

#### Lifestyle impositions caused by the method

87% of subjects considered SNI to be of no inconvenience to their lifestyle during the twice daily phase. 97% found it of no inconvenience during the 12 month optional phase. There were a few humorous responses such as “Yeah, now we have to go to the bathroom for the salt when cooking!” and “Yeah, we run out of shower hot water more often!” which we took as negatives.

#### Likelihood of longer term usage

The intended future usage by the 33 users remaining (out of 46) at the end of 16 months was: 19 (=58%) on a regular basis (equates to 41% of all original participants)

14 (=42%) when needed. (equates to 30% of all original participants)

We must assume that the balance who stopped using (13 out of the original 46, = 29%) intend not to use at all.

## **SUMMARY & DISCUSSION**

(Rabone)

The study provides reasonable evidence that SNI significantly improves nasal symptoms in volunteer woodworkers. It shows that most woodworkers who wish to try the procedure will regard it as a useful aid (Figure 1). They will continue to use it, with varying regularity according to their own needs (Table 2). They are most likely to use it after exposure to wood dust (Table 2). The perception of symptoms measured using the questionnaires, is subject to a large measurement error, yet the results strongly indicate a reduction of nasal symptoms using SNI. The behaviour of the woodworkers by continuing to use SNI when optional is the strongest evidence of SNI's efficacy, but it is of note that the additional, if weaker questionnaire evidence supports the original hypothesis the SNI decreases nasal symptoms.

The results must apply only to volunteers and are not generalisable. It is recognised that many woodworkers (and people in general) would not wish to try it and therefore could not benefit from its use.

Potentially, 20% of people exposed to wood dust would benefit from knowing about the procedure. Volunteers were used in this study after a recruiting presentation detailing information about nasal cancer and nasal symptoms. It is estimated that only one third of those who listened volunteered for the study. Comments in the questionnaires indicated that 35 volunteers did so because of recurrent nasal symptoms and 4 because of a fear of developing nasal cancer. Obviously the study excluded wood workers who were not adventurous enough to attempt SNI or couldn't be bothered to join a 16 month study regime. The authors feel that this mimics what would occur in industry if information were to be advertised.

If tolerated, the procedure is cheap, convenient, and probably harmless. Present therapeutic options for woodworkers include vasoconstrictors (which produce tolerance and rebound phenomena) and nasal steroids. Both are expensive and use medical resources. Therapeutic options for those with nasal cancer are quite limited.

Nasal cancer questions remain unanswered. Reports from participants indicates that SNI helps removes wood dust from the nose and reduces symptoms. There is therefore reason to believe that regular SNI might reduce nasal cancer risk. The answer might not be forthcoming because this proof would require a longitudinal study of very large numbers of people over decades.

It is possible that this procedure would be of use in removing dust from the nose in other dusty occupations.

The effects of SNI on other aspects of health were not conclusively determined by this study. Results during the cross-over period were not consistent with those obtained at 1 year follow up. The questionnaires did not measure with great accuracy. In the absence of a direct physiological explanation for symptoms, results must be regarded with caution.

The study concludes that the procedure of SNI deserves more attention from industry and training groups. Maybe the technique could be introduced to woodworkers during apprenticeships or training as an option to try if nasal symptoms become a problem, if compliance with wearing of personal protection is difficult or if development of nasal cancer is of concern.

## **SUMMARY & DISCUSSION**

(Saraswati)

Whilst not analysing the responses to my own questionnaires to the degree of Dr Rabone and showing statistical outcomes for all the hypotheses stated, many responses obtained from the participants do give indication to positive outcomes in a number of areas not covered by Rabone's analysis as well as indicating other interesting possibilities about SNI warranting more investigation and study.

I consider the main issue not successfully covered in the study was the failure of ascertaining the most beneficial frequency of a nasal wash out so as to be more sure of its causes and effects. The twice daily frequency requested during the 16 week cross-over was considered, in my experience, to be the maximum usage which could be sustained on a regular basis and which should definitely show results in its users. It is my contention that the benefits gained during that phase of the trail can be assumed (but not proven by this study) to be the result of this high usage rate (compliance of 77%, average weekly frequency of  $f = 10.8$ ). Traditionally, the technique is advised at least once, preferably twice daily. The usage rates in the follow up year dropped dramatically when usage was optional to (on average) less than one third of this ( $f = 3.02$ ). I believe the inconsistent results gained during this second phase are directly attributable to the frequency of usage dropping below the daily minimum of one application of SNI per day. Perhaps the study has shown how a decrease in usage renders the technique less effective??? Unfortunately no cross checks were made between frequency of usage and benefits gained. Such small numbers would probably make such endeavours meaningless. The reasons for the drop off in usage was caused by a combination of:- lack of prescriptive guidance, changes in working regime, unattended side effects, as well as human forgetfulness and busyness.

The subjects were not given any data feedback about the results of their 8 week usage. They were led to believe that the study's main focus and SNI's main purpose was to reduce wood dust in the nose. They were therefore choosing usage rates based purely on their own experiences of the technique and their own woodworking regimes. Therefore the acceptability factor as judged by the longer term usage should be treated as a minimum range indicator.

This issue needs to be closely examined in all future trials for, without a recommended “dosage”, no therapeutic substance or technique can be assured of releasing its potential healing qualities. Without a recommended frequency of usage, users and potential users would have no idea of the effectiveness their actions may have which will reduce the attraction to as well as implementation of the therapy.

It would seem obvious that workers in many other dusty occupations could benefit from SNI, perhaps in an even greater way than the woodworkers have indicated here. Given the relatively large particle size of wood dust compared with say plaster dust, coal dust, fibreglass insulation, ceiling dust, or pollen, and considering that many in the wood working shops have dust extraction systems and personal protection gear on hand, it does seem likely that an even greater acceptance of nasal irrigation may be found elsewhere in industry.

A controversial area is the issue of dangers to health arising from mouth breathing. The participants reported great improvement in nasal airway clarity with a corresponding reduction in mouth breathing. Although not shown in this study the known and suspected effects of mouth breathing could indirectly be lessened by use of SNI. Common cervical and thoracic ailments may be found to benefit indirectly from clearer nostrils.

One design fault leading to weakness for data interpretation was the omission of a suitable “wash-out period” between the intervention cross overs. Certain effects of SNI may well have a “carry over effect” beyond ceasing usage.

One disadvantage of SNI in terms of its accessibility to the many people for whom it may be useful, is the need for hands on tuition. Contrary to the opinion of some users and some yoga teachers, Jala Neti (saline nasal irrigation) is not always an easy thing to learn (or rather, some noses are not easy to teach it to)! For reasons previously stated in the sections on side effects and contra-indications, an experienced instructor (or else a long time user whose own experience has conquered likely difficulties) should always demonstrate the technique firstly, and then help the new student through their first application. Depending on ease of learning, days or even weeks of follow up assistance by phone or sometimes a second lesson may be required to help those with nasal quirks gain competence with the procedure. The proportion of the total populace to whom this may apply is estimated to be 30%. Sometimes professional diagnosis of the cause of problems is needed and an instructor may need to refer the student to a GP or ENT specialist for appraisal. So therefore, it is the opinion of this teacher, and this is backed up by data in this particular research effort, that a nasal cleaning pot should only ever be sold inclusive of an instruction session and subsequent access to follow up assistance. Consequently this would make learning SNI far less commonplace. As a teacher of SNI as well as manufacturer and distributor of the nasal cleaning pots, I would not be recommending sales of nasal cleansing pots through outlets like chemist shops, health food stores or unrestricted mail order but rather through medical practitioners, naturopaths, yoga schools, hospitals, travelling instructors and other places where the time and expertise is available to offer the proper learning method.

The study gives indications of SNI’s potential usefulness in other areas of health and well being. I think that the effects of wood dust upon woodworkers is only a starting point from which to explore the wider ramifications of a clean and well functioning nasal system. The technique could well be made known in medical education and community health as a cheap, easy and effective aid to better breathing and other connected faculties.

## **FUNDING**

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**Table 1: Perceptions of participants during the trial on a scale of 0 to 100.**

	mean perception without (with) SNI	p value	mean perception control (1 year)	p value
<b>Eye problems (Total)</b>	27 (28) N=44	0.6271	33 (23) N=38	0.0240
Burning/itching	15 (12) N=44	0.1502	21 (10) N=36	0.0085
Dryness	16 (13) N=45	0.1458	20 (18) N=34	0.6832
Watering	12 (11) N=42	0.8878	12 (6) N=34	0.0322
Blurred vision	11 (11) N=42	0.4386	14 (13) N=35	0.6513
Puffiness	8 (7) N=42	0.6294	10 (9) N=34	0.9121
Redness	17 (16) N=44	0.4055	17 (14) N=36	0.2407
Grittiness	21 (20) N=45	0.7185	24 (19) N=34	0.0960
<b>Nose problems (Total)</b>	51 (37) N=44	0.0001	59 (39) N=37	0.0001
Dryness	18 (14) N=43	0.0560	15 (9) N=37	0.0183
Blocked/congested	39 (31) N=44	0.0078	40 (32) N=37	0.1065
Sinus problems	30 (19) N=44	0.0010	30 (21) N=35	0.1101
Runny nose	24 (21) N=44	0.3129	27 (15) N=37	0.0053
Nose bleeds	8 (9) N=43	0.8830	12 (7) N=37	0.0821
Post-nasal drip	14 (12) N=42	0.4536	15 (12) N=33	0.1230
Itchy/sneezing	25 (21) N=44	0.0915	35 (17) N=38	0.0001
Poor sense of smell	22 (20) N=44	0.2106	26 (17) N=36	0.0275
<b>General problems (Total)</b>	25 (21) N=44	0.0504	37 (20) N=31	0.0003
No energy	18 (14) N=44	0.0518	28 (19) N=36	0.0245
Headaches	18 (14) N=44	0.1221	17 (12) N=36	0.0582
Snoring	25 (22) N=43	0.1135	27 (17) N=34	0.0126
Fuzzy thinking	19 (18) N=44	0.6299	21 (16) N=37	0.0778
Sore throat	19 (13) N=44	0.0898	17 (11) N=36	0.0088
Emotional ups /downs	2 (14) N=44	0.0274	20 (18) N=37	0.5379
Frequent colds	16 (12) N=44	0.0671	16 (9) N=36	0.0263
<b>General Health</b>	34 (30) N=46	0.2238	28 (25) N=37	0.2393
<b>Going to sleep</b>	19 (21) N=44	0.3283	19 (21) N=37	0.4358
<b>Waking up</b>	51 (47) N=43	0.2397	49 (44) N=37	0.2275
<b>Waking at night</b>	48 (40) N=45	0.0193	42 (47) N=37	0.2756

**Legend:**

Nose, eye,	No problem=0	Some problem=50			Lots of problems=100
General problems					
Getting to sleep	Easy 0			Difficult=100	
Waking at night	Never=0	Sometimes=33	Often=67		Always=100
Waking up	Refreshed=0			Tired=100	
Specific symptoms	No problem=0	Minor problem=25	Quite annoying=50	V. annoying=75	Require treatment=100

**Table 2: SNI Usage of 46 subjects after 1 Year**

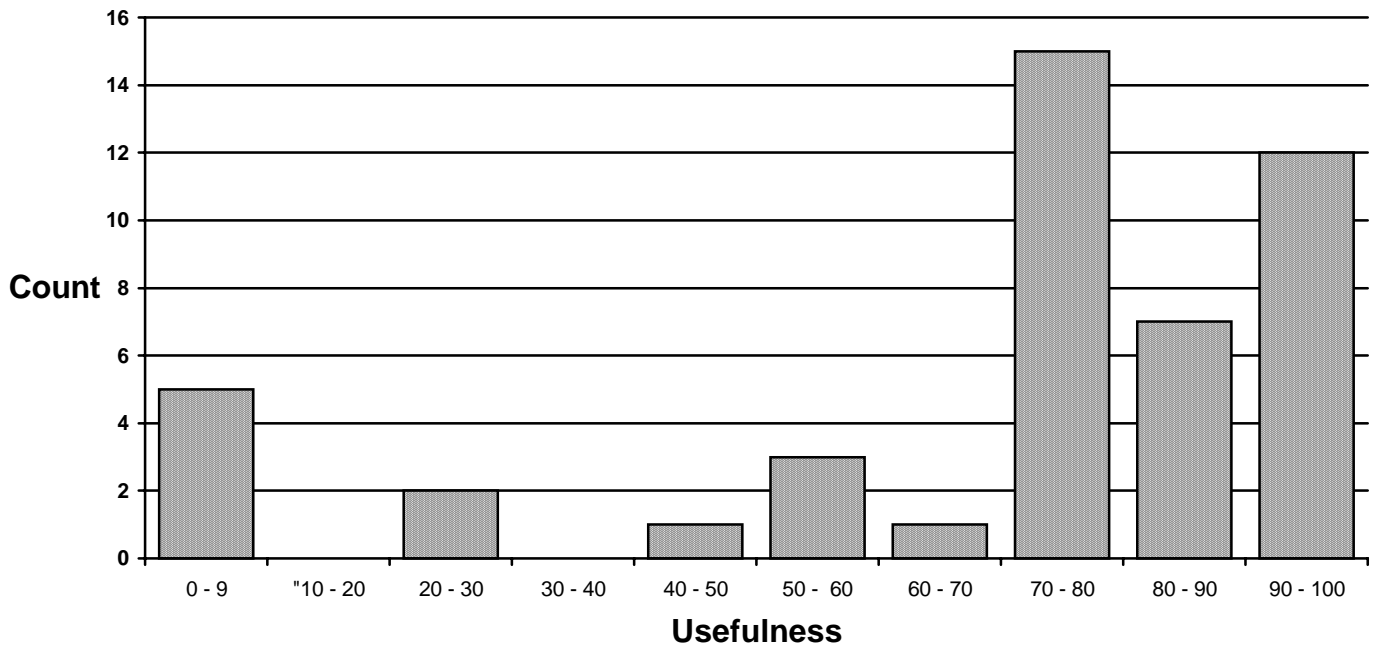
Never	Rarely	After dust exposures, occasionally	After dust exposures, Regularly	For other reasons, occasionally	For other reasons, regularly	Every day
9	4	9	12	3	2	7

**Table 3: Comments of participants**

<b>ID</b>	<b>Comments</b>
1	"It did remove wood-dust from my nose. I didn't buy a pot. I do much less woodwork now I changed jobs."
3	"SNI definitely keeps the nasal passages clean. I don't use it as often as I should. If it was shown to have a positive effect on nasal cells I would use it more."
4	"I use it as required. It usually gives me good relief of my wood dust symptoms. I had chemotherapy and found it brilliant for headaches during that."
5	"I'm lazy. I do use it after a long dusty day or if my nose feels irritated."
6	"No adverse effects but not able to make a habit of it. Use as required."
7	"I use it every day. It suits me and helps."
8	"I am amazed how much dust gets into my nose by just being in the workshop. A lot comes out with SNI."
9	"After my stroke this year I didn't use SNI. As soon as I got back to dusty conditions it was a relief to use the pot again."
10	"Time and convenience diminished its use. I use it after very dusty days."
11	"I use it every day. I get wood dust in my nose despite the fans and mask. SNI removes the dust, my nose feels clean and I feel I am less likely to get cancer."
12	"It's great. I would benefit from doing it more often but it's still worthwhile a few times a week."
13	"Nice to do but easy to forget. I haven't managed to fit it into my daily routine but I remember to use it before and after a big day in the workshop."
14	"I only use it after being in the workshop but it helps clean my nose."
15	"I use SNI about 1-3 times a week after I do woodwork. I find SNI most pleasant to do. I like the clean 'after' feeling."
16	"Masks hurt my neck so SNI has been helpful as another option."
17	"It is useful and I use it."
18	"I find that when I use the pot after working in wood-dust it really does clean out my nose and makes sleeping and breathing easy."
19	"I have found SNI is great especially after being in any dusty environment."
21	"Wonderful beneficial. My asthma is improved."
23	"I now wash my nose out with tap water. SNI was really good but I can get the same result with tap water."
29	"Love it and will continue."
30	"I had problems using it when my nose was very blocked. I take medication which doesn't help much."
31	"I will continue using SNI as part of my after work routine. I shower and use it. It has particularly helped when I'm blocked up."
32	"No adverse effects. I use it once a week or so on days when there is significant dust."
34	"I feel lucky to have been made aware of this procedure by the study and it has now become part of my everyday life."
35	"I definitely think it's a good idea. I had a series of colds and I have used it less since then. This prompting might kick me back into it."
36	"It made my head heavy. I couldn't dry my nose. Also I'm too lazy."
37	"I have not been working much this year so I don't use it."
38	"Thumbs up!"
39	"Sorry I lost interest."
40	"It is good to see all the dust coming out. I can't dry all the inside of my nose properly."
41	"My wife says my snoring has improved and I sleep better."
42	"It helps"
45	"I have been irregular in use but I will continue. It seems to me SNI frees nasal passages and prevents build up in nose which 'crusts'. It assists uninterrupted sleep, maintains clear sinus passages and improves my well-being."
46	"I use it when I have a stuffy nose to clear out mucous."
49	"I still use it and it's there if I want it mainly for stuffy nose."
50	"I had sinus problems for a few years and they went away after SNI. I changed jobs and use it now for cement dust."

No response from ID's number 2, 20, 22, 25, 26, 33, 43, 44

**Figure 1 – Perceived usefulness of SNI at 1 year follow up (n = 46)**



where: 0=no use, 25= little use, 50= some use, 75=quite useful, 100=very useful

	at 8 week crossover			At 16 wk crossover			after 16 months		
	improve	same	worse	improve	same	worse	improve	same	worse
Gp 0	0	20	2	<b>9</b>	13	1	4	14	1
Gp 1	<b>11</b>	10	1	1	15	4	1	17	0
% imp. in user group	<b>25</b>			<b>23</b>			<b>13</b>		

	First 8 weeks			Second 8 weeks			12 month period		
	Imp.	Same	Worse	Imp.	Same	Worse	Imp.	Same	Worse
Gp 0	0	20	2	<b>13</b>	8	1	7	12	1
Gp 1	<b>15</b>	4	3	2	5	13	7	11	0
All	15	24	5	15	13	14	<b>14</b>	22	1
Improvement in intervention group	<b>60%</b>			<b>52%</b>			<b>39%</b>		

<b>Table 6 – Changes in Frequency of Nasal Airflow Imbalance</b>				
	After 8 weeks of usage		After 12 months more of usage	
	<b>decrease</b>	<b>no change or increase</b>	<b>decrease</b>	<b>no change or increase</b>
Gp 0	13 responses (56%) had an av. 22% decrease	10 responses (44%)	16 responses (70%) had an av. 18% decrease	7 responses (30%)
Gp 1	19 responses (83%) had an av. 22% decrease	4 responses (17%)	13 responses (56%) had an av. 23% decrease	10 responses (44%)
All	32 responses (70%) had an av. 22% decrease	14 responses (30%)	29 responses (63%) had an av. 22% decrease	17 responses (37%)

<b>Table 7 – Summary of Nasal Imbalance</b>		
<b>Number Out of 46</b>	<b>Comments</b>	<b>Summary of effect</b>
16	Respondents had healthy nasal airflow patterns at the beginning and throughout the whole trial, to which SNI made no reported difference	No effect
9	SNI appears to have normalised nasal airflow patterns, either within 8 weeks of usage or during 12 month follow up	Good effect
5	Respondents had fluctuating nasal airflow patterns (most probably caused by chronic nasal mucus blockages) which seemed unaffected by SNI	No effect
5	Respondents had an unchanging nasal airflow blockage (always on the same side) throughout the whole trial indicating a structural nasal blockage upon which SNI made no difference	No effect
4	Respondents recorded a bad response to the technique (ie adverse nasal airflow reactions)	Adverse effect
7	non-specific results due to incomplete data	Undefined effect
<b>46</b>	<b>TOTAL</b>	

<b>Table 8 – Changes in Frequency of Mouth Breathing</b>				
	At beginning of trial	At 8 week crossover	At 16 wk crossover	After 16 months
Gp 0 av	43	40	<b>30</b>	38
Gp 1 av	47	<b>31</b>	34	32
All av	45	36	32	35
% decrease in user group		<b>16%</b>	<b>13%</b>	

<b>Table 9 – Perceived Change in Frequency of Mouth Breathing</b>									
	At 8 week crossover			At 16 wk crossover			After 16 months		
	Improve	Same	Worse	Improve	Same	Worse	Improve	Same	Worse
Gp 0	0	21	2	<b>8</b>	13	1	5	13	1
Gp 1	<b>6</b>	13	1	2	12	5	6	12	0
All	6	33	3	10	25	6	<b>11</b>	25	1
% of respondents improved	<b>24</b>			<b>32</b>			<b>24</b>		

<b>Table 10 – Difficulties Experienced</b>					
		On first occasion	During first week	During first 8 weeks	During 12 months
(a)	no problems	21	32	31	30
(b)	water running into mouth	9	3	4	0
(c)	slow flow caused by blocked nostril(s)	5	3	6	3
(d)	finding correct head angle	8	0	0	0
(e)	dry nose properly	1	3	2	2
(f)	stinging from wrong salt & water mix	0	3	3	0
(g)	sealing pot at nostril	1	0	0	0
(h)	nose bleed	1	3	1	0
(i)	Pain/pressure in sinuses	1	0	1	1
(j)	Other	1 tender nostril 1 worry of infection	3 Headache 1 bad congestion	1 sinus infection 1 heavy flu	2 water in ears
	No Response	0	0	0	8

<b>Table 11 - Overall Intended and Actual Usage Rates in Whole Trial and Beyond</b>									
	8 week phase	During the 12 month phase				Beyond the study's 16 months			
Freq.	2 x daily	Not at all	Need to basis	Regular basis	No Response	Not at all	Need to basis	Regular basis	No Response
Intended	46 (100%)	1 (2%)	8 (18%)	33 (72%)	4 (9%)	1 (2%)	18 (39%)	20 (43%)	7 (15%)
Actual	(av) 70%	3 (7%)	28 (61%)	7 (15%)	8 (17%)	?	?	?	?

<b>Table 12 – User compliance during the 16 week cross over phase (where 100 = 2 x daily unfailingly)</b>																			
0	10	40	45	49	50	60	70	75	80	85	90	91	92	93	95	98	99	100	<b>T O T A L</b>
		40			50			75		85	90				95	98		100	
		40			50			75		85	90				95	98		100	
					50			75			90				95				
								75			90				95				
											90				95				
1	1	3	1	1	4	1	1	5	1	3	8	1	1	1	6	3	1	3	<b>46</b>
Overall average compliance = 77%																			

<b>Table 13 – Reasons for Fluctuation in Usage &amp; Lack of Compliance In the 8 week Cross over period</b>	
Occasionally did it late due to social engagements	just a bit busy
woke late and rushed off to work	a few times a bit bothersome
forgot towards end of 3 days off woodwork	forgot a few mornings in the rush
running late	in a hurry
forgot evenings after a night out	forgot when nose felt clear
didn't take pot when away from home	unsure about 4 hour rule so didn't do it
forgot (when not woodworking)	didn't do it when camping.
forgot on busy mornings	unavoidable problems at times
forgot 2 mornings, gave up when camping 3 days	forgot when away or home very late
forgot and sometimes not enough time	missed occasionally after a late night out
forgetting to take pot away on weekends	forgot when in a rush to go out
forgot to pack the pot on weekend trips	not always necessary
herpes at nasal opening for 2 weeks and didn't do it	sometimes forgot the morning session
forgot sometimes when rushing for work	when away on weekends
Didn't do when nose felt clear	rushed to gym early
lack of time	forgetfulness
when routine broken eg away from home	forgot some afternoons
has the flu twice so didn't do it	too preoccupied to do it before teatime
reduced to 1x daily, but twice when dusty	mornings disagreed with me
since not in workshop 1x daily was enough	had breakfast by mistake
used only once per day for 5 days and then not used since week 7 due to severe head cold	stopped doing regularly due to nose bleeds but continued from time to time
seemed to be more prone to catch colds	only did it once a day for 5 weeks
I found when I use it 2x day I got head cold symptoms and I'm sure I dried my nose properly	tried for 1st week and gave up

**Table 14 – Usage During 12 month follow up**

	Beginning	Trend	End	Average	Comments on usage during 12 months
abruptly stop		2			- Did not use when nose very blocked or forgot
lessen then stop		10			- Use only after dusty or paint fumes when nose is blocked or irritated
lessen but continue		20			- Only used with irregular exposure to wood dust
stayed the same		12			- SNI decreased as exposure to wood dust decreased
increased		0			- Stopped working with wood
fluctuated		2			- Use it dependent on time in the workshop
not at all	4		13	3	- Would like to use more
less weekly	7		10	12	- Out of nose, out of mind
1 - 3 x week	10		8	8	
3 - 4 x wk	6		7	8	
1 x day	5		5	5	
1 - 2 x day	5		2	2	
reg 2 x day	1		0	0	
No Response	8		1	8	
<b>Total</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>46</b>	

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