



# Demystifying Vocal Hygiene: Considerations for Professional Voice Users

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## Abstract

**Purpose of Review** Discuss current literature and clinical experience related to vocal hygiene, with special consideration for the professional and performing voice user.

**Recent Findings** Use and non-use-related vocal hygiene factors that may impact professional and performing voice users include hydration, laryngeal irritants, phonotrauma, and voice rest. Key considerations include monitoring both systemic and surface hydration, maintaining awareness of key signs and symptoms of reflux, avoiding phonotraumatic patterns and/or learning to pace voice use when high-impact vocal behaviors are required. Complete voice rest is better suited to treat acute injury and not practical for day-to-day vocal management.

**Summary** Vocal hygiene is one tool within voice therapy that plays a key role in vocal injury prevention and rehabilitation when paired with direct voice therapy. Vocal hygiene education should be individualized, guided by the tenants of meta-therapy and motivational interviewing to increase self-efficacy for change and adherence to recommendations.

**Keywords** Vocal hygiene · Vocal health · Professional voice · Performing voice · Phonotrauma · Voice therapy

## Introduction

Vocal hygiene has been a mainstay in voice therapy and education through the years, referenced in the literature as far back as 1886 in the context of “the hygiene for the vocal organs” [1]. With the development of the taxonomy of voice therapy by Van Stan and colleagues in 2015, voice therapy has been organized into three categories including direct interventions, indirect interventions, and intervention delivery models. Indirect intervention is broken into pedagogy and counseling. Pedagogy supplies knowledge and strategies that impact vocal health, while counseling addresses psychosocial factors that may relate to vocal health. In this taxonomy, vocal hygiene is a tool within pedagogy defined as “an indirect intervention tool in which the clinician provides strategies to improve vocal health by modifying the physical environment of voicing” [2]. While definitions of

vocal hygiene over time have many commonalities, as more is learned about prevention of vocal injury and voice rehabilitation, practice patterns related to vocal hygiene are evolving.

Traditional vocal hygiene education typically included a list dos and don’ts and has been associated with language including vocal misuse and abuse. While there is still some truth to the concept of “do this” and “don’t do that” for vocal hygiene optimization, the approach to this “check-list” has evolved to focus more on patient-specific factors that include identifying the aspect(s) of vocal hygiene with highest impact (e.g., loud voice use for someone with phonotraumatic lesions, hydration for someone with a sense of delayed onset in their upper pitch range) (Table 1). Additionally, current terminology has shifted from vocal abuse to phonotrauma and muscle tension to avoid negative impacts on self-efficacy [3]. This evolution of vocal hygiene education aligns with the tenants of meta-therapy, which is believed to be an essential determinant of successfully changing vocal behavior [4•]. Meta-therapy, the conversations that build a framework for voice therapy, helps to identify treatment components, ingredients, mechanisms of action, and targets aligning with the Rehabilitation Treatment Specification System (RTSS) [4•]. With this framework in mind, the identification of targeted vocal hygiene factors is patient driven, taking into consideration social cognitive factors including self-efficacy, goal commitment,

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**Table 1** Vocal hygiene factors: Not a list of do's and don'ts

| Vocal hygiene factors  |  |
|--|--|
| Non-use:   | Use:   |
| <ul style="list-style-type: none"> <li>• Hydration</li> <li>• Laryngeal irritants</li> <li>• Reflux</li> <li>• Smoking</li> <li>• Medical comorbidities</li> <li>• Sleep</li> <li>• Physical activity and laryngeal valving</li> </ul> | <ul style="list-style-type: none"> <li>• Vocal demands               <ul style="list-style-type: none"> <li>• Personal and professional</li> </ul> </li> <li>• Loud voice use</li> <li>• Ambient Noise</li> <li>• Amplification/Monitors</li> <li>• High-pitch voice use</li> <li>• Throat clearing and coughing</li> <li>• Talking when sick</li> </ul> |

and the therapeutic alliance, which are known to impact voice therapy outcomes [5].

There is a body of literature related to vocal hygiene in various populations including teachers and singing teachers, singers with varying levels of training, actors, information technology-enabled service professionals, and voice over artists, to name a few [6–11]. There are varied recommendations and outcomes, however with the emerging theme that vocal hygiene education should be specifically geared to the target audience which then may require more targeted outcome measures. Regarding the use of vocal hygiene as a proactive tool, a recent systematic review and meta-analysis of the effectiveness of vocal health programs in the prevention of voice disorders in teachers showed no evidence to support the benefit of direct or indirect voice training when compared to no training [12]. The authors noted that each study in the analysis demonstrated some benefit from the intervention provided, and voice training should not be deemed ineffective. However, there is a call for more robust sample sizes and methodological criteria, along with standardized outcomes related to the prevention of vocal injury, further reinforcing this idea of targeted vocal hygiene for a well-defined audience with specifically designed outcomes measures.

Regarding the use of vocal hygiene as a therapeutic tool, there are mixed results in the literature, though it is clear that to optimize voice therapy outcomes, vocal hygiene should generally be paired with direct voice therapy techniques [7, 12, 13]. These findings should not undermine the importance of vocal hygiene in prevention of vocal injury, rehabilitation, and vocal maintenance, as sometimes identifying a modifiable vocal hygiene target can lead to a breakthrough in vocal awareness and health. Vocal hygiene targets should be grounded in an understanding of the specific voice user or group of user's vocal requirements. Implementation of vocal hygiene techniques should be centered around developing self-awareness, increasing self-efficacy, and ultimately empowering the voice user with the knowledge that they can impact change in their vocal decision making, voice use patterns, and ultimately their

voice. For example, using the RTSS model: The ingredient is the patient is encouraged to “take ownership” of their vocal decision making, the mechanism of action is shifting from passive information processing to active processing, the target is increased voice related self-efficacy, and overall aim is to improve voice-related quality of life [4•].

It is important to acknowledge definitions in the literature distinguishing professional and performing voice, which will be used throughout this manuscript. Guss and colleagues (2014) suggest performing voice refers to those individuals who intend to earn their livelihood from public performance, while professional voice refers to a broader group of individuals who have high occupational voice demand and do not require the same rigor or scrutiny related to artistic and/or technical performance [14]. All voice users and specifically professional and performing voice users, who rely on their voice for their livelihood, will benefit from education, awareness, and implementation of vocal hygiene techniques.

Throughout this article, aspects of vocal hygiene including non-use (hydration and laryngeal irritants) and use factors (phonotraumatic voice use patterns and voice rest) will be explored. Common clinical questions will be discussed in the context of the current literature and clinical experience, applied through the lens of caring for the professional and performing voice user.

## Non-Use Factors — Hydration

Hydration is arguably the most universally regarded vocal hygiene recommendation. This recommendation comes from the consensus that reaching an adequate level of water in the body (systemic hydration) keeps mucosal tissue healthy, while optimizing the moisture level on the surface of the vocal folds (surface or superficial hydration) keeps them lubricated and pliable [15, 16•]. Classic hydration recommendations include drinking 8 glasses (64 oz) of water per day, avoiding drying agents such as caffeine, and using humidification or steam inhalation when exposed to dry environments. Though there is evidence to support hydration state impacting the structure and function of the vocal folds, whether that translates to changes in vocal quality or effort has been a source of debate [17–21].

## What is the current evidence for the impact of hydration state on the voice?

### Systemic Hydration

Alves and colleagues conducted a systematic review in 2019 to investigate the impact of systemic hydration states on the voice [17]. The included studies examined the effect of systemic dehydration via fasting and not ingesting fluids

for a range of 14–18 h (for example, two studies followed participants during Ramadan), with one study examining the effects of rehydration following this fasting period. It was found that systemic dehydration significantly negatively impacts acoustic parameters, phonatory efforts, and grade of hoarseness, while systemic rehydration positively impacts acoustic parameters. This review concludes that maintaining an adequate state of hydration positively impacts voice quality.

Although this knowledge supports systemic hydration as an important factor in vocal hygiene, it is difficult to translate these findings into practical recommendations, particularly regarding what level of dehydration impacts voice production outside of fasting conditions. Interestingly, Wu and Zhang in 2022 used a parametric computational simulation involving a three-dimensional vocal fold model to investigate the impact of systemic dehydration on vocal fold stiffness. They found that systemic dehydration only had significant effects on voice production at high levels of dehydration [22]. With this finding, it could be argued that average levels of hydration via intake of fluids and food may not significantly impact vocal fold vibration and stiffness.

### Surface/Superficial Hydration

While the impact of systemic hydration remains somewhat nebulous, investigations into surface hydration seem to be consistently aligned regarding its positive effect on the voice. There is growing support especially for inhalation of nebulized saline solution, which significantly improves perceptual ratings, acoustic parameters, and electroglottographic closed quotient as well as an increase in mucosal wave [16•, 23, 24]. A recent study using high-speed videolaryngoscopy also found that surface hydration via nebulized saline decreased the maximum glottic opening and increased the percentage of glottic closure during phonation in women without laryngeal abnormalities, suggesting better phonatory efficiency [25]. A few of these studies found positive effects after a nebulization time of 10 min, which may easily translate to feasible clinical recommendations.

### Caffeine

Traditional vocal hygiene counseling includes the recommendation to avoid caffeine, as it has been assumed that caffeine intake can have a dehydrating effect on the voice due to its diuretic properties. Recent evidence has busted this theory, revealing that a moderate amount of caffeine does not impact voice production including phonation threshold pressure, acoustic, aerodynamic, or perceptual measures

[16•, 26]. Studies with these findings tested up to 480 mg of caffeine, roughly equivalent to five cups of coffee.

### When Should I Emphasize Hydration as Part of Vocal Hygiene Counseling? And What Do I Recommend?

The question of “am I drinking enough water?” is deceptively simple, as there is no easy answer. Studies on achieving optimal hydration support a wide range of water intake, with significant individual variance due to activity, diet, and environmental factors [27]. The Center for Disease Control (CDC) references recommendations from the U.S. National Academies of Sciences, Engineering, and Medicine, that an adequate daily fluid intake is about 15.5 cups (3.7 L) a day for men and about 11.5 cups (2.7 L) a day for women [28]. This recommendation includes fluids from all food and liquid intake, so separating out how much plain water to drink from these recommendations is a challenge. Another challenge is the lack of feasible and reliable daily measurement of hydration status. Sensation of thirst and urine concentration/color has been suggested as the most feasible way to monitor hydration day-to-day, though the validity/reliability of these indicators is questionable [27, 29]. With this, it may be that the old adage “pee pale, sing clear” is a reasonable guideline to track hydration.

There are also mixed results when considering how long it may take for the benefits of “rehydration” to take effect. One study included in the systematic review on hydration found that drinking 1 l of water over 20 min was enough to significantly improve acoustic parameters after fasting-induced dehydration [30]. Another recent study involving women suffering from chronic dry mouth found that short-term water intake did not result in significant improvement of voice properties, suggesting the need for consistent oral hydration [31]. Additionally, in pharmacokinetic analysis, it has been reported that complete absorption of water in the plasma and blood cells occurs within 75–120 min after ingestion [32].

In the absence of specific reliable hydration recommendations, patient education may focus on the understanding that adequate hydration generally has a positive impact on the voice (as well as general health) and that a trial of increased hydration (systemic and/or surface) can be completed if deemed appropriate based on reported habitual water intake, lifestyle, and environment. Increased emphasis on hydration should be considered for performing voice users, as increased hydration has been found to have a significant positive effect on maximum frequency [33].

### When a Patient Reports the Sensation of Dryness, Is It Due to Dehydration?

In voice therapy, it is not unusual to encounter a patient who reports the sensation of a dry spot in their throat when speaking or singing, despite drinking plenty of water throughout

the day. Anecdotally, we often find that behavioral voice techniques to reduce subglottic pressure and release extraneous peri-laryngeal tension can resolve this dry sensation. This serves as a reminder that uncomfortable/dry throat sensations have the potential to lead us down a path in which we are spending a full voice therapy session discussing hydration, when in fact, our time may be better spent optimizing voicing patterns.

### Non-Use Factors - Inhaled Irritants

Another widely accepted tenet of vocal hygiene is the avoidance of inhaled irritants. The negative effect of smoking on the voice has been demonstrated, particularly related to tobacco smoking and more recently to marijuana smoking as well [34–37]. Though there is less known regarding the new trend of e-cigarette and vaping, preliminary investigation indicates a negative effect on the voice, possibly milder in impact than conventional cigarette smoking [38]. Though seemingly obvious, the negative impact of inhaled irritants in vocal hygiene education should not be neglected, particularly the impact of marijuana smoking and vaping that may be overlooked by patients. Performing voice users may be particularly impacted by smoking given the effect that it has on fundamental frequency [36, 37]. Fortunately, recent studies have shown that performing voice users tend to be aware of the negative effects of smoking on the voice and have lower rates of smoking compared to the general population [8, 39]. However, this knowledge may be dependent on the type of performance, as actors have been found to have higher rates of smoking than singers [40].

### Non-Use Factors - Laryngopharyngeal Reflux

When it comes to laryngopharyngeal reflux (LPR), the question is not whether it negatively impacts the voice, as this relationship has been substantiated [41–45]. Rather, the question faced by clinicians is whether a patient's symptoms of dysphonia, globus sensation, or chronic throat clearing are a result of uncontrolled LPR vs a myriad of other laryngeal disorders that can present similarly. From a laryngology/ENT perspective, ensuring adequate workup and/or empirical medical trial for reflux control is often the first step in differential diagnosis. The speech language pathologist (SLP) contributes to differential diagnosis by investigating whether inefficient voice use patterns are the primary etiology of the symptoms and determining candidacy for behavioral therapy as part of the treatment plan. Overt symptoms of reflux, information regarding lifestyle and diet, and the nature of the dysphonia/throat symptoms can all help to narrow in on the most effective treatment plan.

### What Indicators Aid in Differential Diagnosis and Intervention Planning When It Comes to LPR and the Voice?

A detailed description of the timing and nature of a patient's symptoms can guide our differential diagnosis. Dysphonia occurring first thing in the morning or after meals accompanied by increased mucus/PND (in the absence of other rhinologic complaints), productive cough/throat clearing, and overt symptoms of gastroesophageal reflux disease suggests an etiology of LPR. This symptom profile, diet and lifestyle factors (i.e. eating dinner shortly before bedtime), and other high-risk factors including BMI, smoking, and drinking may lead further down the path to LPR treatment rather than voice therapy to target dysphonia or other laryngeal symptoms [46]. Investigations into LPR risk factors based on gender and age have also connected female patients and advanced age with increased prevalence of LPR [47].

Conversely, dysphonia, cough, or globus sensation that worsens throughout the day and with increased voice use may indicate a primary voice disorder. This symptom presentation, along with observations of extraneous perilaryngeal tension and stimulability for symptom improvement with voice optimization techniques during the evaluation, substantiates the role of behavioral voice therapy in a patient's plan of care. Differential diagnosis will also be dictated by laryngoscopy findings, which may clearly reveal an organic vocal fold pathology that drives the intervention plan. Of course, these types of symptoms can be (and often are) multifactorial, so from the SLP perspective, the question becomes whether inefficient voice use patterns are playing a significant role in the patient's concerns and if voice therapy will be a beneficial part of a multi-pronged treatment approach.

As providers, we want to avoid sending a patient down the wrong treatment path for several months (or years) without symptom improvement. It is unfortunate when a patient has been placed on a PPI for 3 years for a primary voice problem or has participated in 10 sessions of voice therapy for an LPR problem. Comprehensive workup, detailed symptom description, and close monitoring of intervention response, along with educating and empowering patients with guide rails for expected response rate and timeline for management, are key to ensuring the most efficient and effective care for these patients.

### Recent Developments in LPR Patient-Reported Outcome Measures

The most widely used instrument that documents symptom severity in LPR is the Reflux Symptom Index (RSI) [48]. However, in day-to-day clinical use, the RSI seems more effective in tracking global throat symptoms than truly

indicating LPR as the etiology of a patient's symptoms [49, 50]. In fact, there is evidence that patients with muscle tension dysphonia had improvement in both VHI-10 and RSI scores following treatment with voice therapy alone, suggesting that symptoms reported on the RSI may actually be secondary to inefficient voice use patterns [51].

Recently, a self-assessment tool for LPR screening in singers (SVHI-12-LPR) was constructed by extracting 12 items from the Singing Voice Handicap Index (SVHI 36) that correlate with LPR indicators on RSI and videolaryngostroboscopy [52]. The development of this tool is rooted in the idea that performing voice users are possibly at increased risk for LPR due to higher intra-abdominal pressure while singing, as well as social factors such as unique schedules with possible late-night eating or drinking [53]. Though additional studies are needed to confirm the validity and reliability of this tool, it presents a new way of evaluating LPR symptoms that specifically impact singing voice.

## Use Factors - Balancing Voice Demand and Reducing Phonotrauma

Understanding a patient's vocal demand allows us to personalize treatment and identify patterns that could be contributing to the voice problem. Particularly for patients with phonotraumatic lesions; vocational demand and social voice use patterns often play a significant role in their diagnosis and symptoms [54, 55]. Troubleshooting modifications to vocal demand can be difficult, especially for professional and performing voice users who rely on high demand for their livelihood.

Questions regarding complete voice rest often arise in the setting of voice rehabilitation when working to reduce phonotrauma. Voice rest is generally recommended in response to acute illness, hemorrhage, or post-operative healing and can be effective in these specific situations [56–58]. Additionally, a combination of short-term voice rest and steroid injections has been found to improve diagnostic clarity in phonotraumatic lesions in performing voice users by improving acute vocal fold tissue changes such as laryngeal inflammation or trauma-induced vocal fold keratosis [59]. However, for many patients with phonotrauma and hyperfunction, complete voice rest is not a functional or long-term solution and can have financial implications for professional and performing voice users. When addressing phonotrauma, it is important to emphasize more functional and individualized solutions to rehabilitate the voice.

When it comes to reducing phonotrauma, addressing the environment for voicing is salient, particularly with focus on amplification and environmental acoustics. The use of amplification can allow professional voice users to maintain the same phonation time while decreasing the number of vocal fold oscillations and amplitude of vibration,

thus reducing exposure to phonotrauma [60]. Optimizing communication with technology may include using wireless headphones instead of speakerphone when making a call, microphone/headset instead of computer audio in virtual meetings, personal amplification device or an installed amplification system for professional voice users, and sound-proofing spaces regularly used for recording and optimizing microphone use and audio feedback (e.g., external or in-ear monitors) for performing voice users.

Another key aspect of reducing phonotrauma is increasing the patient's awareness of their voice use patterns in the context of their vocal demand. Motivational interviewing can be used to guide the patient's perspective and explore collaborative solutions. This involves skillful listening and constructive discussion about behavioral change, often resulting in increased internal motivation for change, increased adherence, and stronger therapeutic alliance [61]. Motivational interviewing works as a part of meta-therapy, with the ultimate goal of creating a framework to modify the patient's knowledge, attitude, and awareness about the process of vocal improvement [4]. These discussions may start with the patient describing their typical day, beginning to end, for contextual relevance of recommendations. As the transition to problem solving begins, thoughtful word choice and empathetic language can minimize resistance to change [61]. Below are considerations for increasing awareness of voice use patterns and reducing phonotrauma.

- Can the patient identify speaking habits that may contribute to phonotrauma? (e.g., yelling over background noise at a bar or long conversations over speakerphone on their commute)
- Can they identify solutions to reduce the demand on their voice in these types of situations? (e.g., selecting a table on the patio of a restaurant where there is less background noise, walking downstairs to speak to a family member instead of yelling to them, choosing to send a text or email instead of calling)
- Can they identify times throughout the day to let their voice rest, then reset with voice optimization techniques?

This dialogue is meant to increase the patient's internal locus of control and empower them to be an active participant in their voice rehabilitation.

Furthermore, with performing voice users, discussions often center around prioritizing vocal demands and considerations that impact these decisions. Initially, it is important to understand the performer's goals in the specific situation and the status of their voice (e.g., healthy vs injured), as the performer is often balancing the needs of their performance team (performance partners, producers, managers, venues, crew, etc.) with their personal, professional, and financial responsibilities. Is there a way to keep essential voice use

**Table 2** Key takeaways for vocal hygiene in voice therapy

| Vocal hygiene in voice therapy   |  |
|--|--|
| Patient-driven goal setting<br>Identify barriers to progress   | Vocal hygiene is <i>one tool</i> within voice therapy  |
| <ul style="list-style-type: none"> <li>• Avoid a list of do's and do not's</li> <li>• Consider role of meta-therapy and Motivational Interviewing</li> <li>• Guide the patient to identify impactful choices/patterns</li> </ul> | <ul style="list-style-type: none"> <li>• Vocal hygiene should not be the only therapy target</li> <li>• When vocal hygiene targets are identified</li> <li>• Briefly check in each session</li> <li>• Spend additional time if problem solving is required (e.g., performer is responsive to direct voice therapy techniques; however, when selling merchandise after a show, they consistently lose their voice)</li> </ul> |

and minimize non-essential voice use? Time should be taken to explore what is required for a performance — does the performer need to give 100% at all times and during every performance? Should the singer continue voice lessons during voice rehabilitation or take a break and transition back to the singing studio at a certain point in the rehabilitation process [56]? Each of these discussion points may impact the individual performer in different ways, and it is the clinician's responsibility to educate on risks and benefits of various vocal activities so the performer can make informed decisions about their voice use patterns.

### Use Factors - Coughing/Throat Clearing

Coughing/throat clearing and dysphonia are undeniably linked, with voice therapy used as a tool to improve chronic coughing, and the treatment of chronic cough improving dysphonia [62–64]. Habitual coughing/throat clearing contributes to phonotrauma, and therefore is often included in vocal hygiene education. In this education, identifying triggers for coughing/throat clearing can help to determine when to send the patient for further medical workup/treatment (e.g., in the context of allergies, asthma, or LPR), versus focusing on behavioral management. Habitual coughing/throat clearing triggered by speaking or singing is commonly observed in voice therapy. The reason for coughing/throat clearing can be described by patients as a reaction to an irritation in their throat when they speak or sing, or as a response to changes in voice quality (e.g., they hear a rough quality in their voice, so they clear their throat to “clear” their voice). While cough/throat clear replacement strategies are helpful, in this case, optimizing voice use patterns that are causing the irritation or quality change may be more effective. An important element to this retraining (and all chronic cough retraining) is educating the patient to reframe their cough/throat clearing from “productive” to “perpetuating and phonotraumatic” and empowering them to use alternative responses to reduce the urge and replace the cough response, rather than just suppress the cough.

### Conclusions

Vocal hygiene is an indirect intervention tool in which education and strategies are provided to optimize vocal health by changing the physical environment. Vocal hygiene can play a key role in prevention of vocal injury, voice rehabilitation, and maintenance of overall vocal health in professional and performing voice users. Although, it is rarely done in isolation and should be paired with direct voice therapy to achieve effective outcomes. Often after vocal hygiene targets are identified, only a brief check in is required each therapy session for accountability and tracking progress, and attention can therefore be focused on direct therapy techniques (Table 2).

While the tenants of vocal hygiene have not changed significantly over the years, as our knowledge of the role of vocal hygiene in the prevention and treatment of vocal injuries grows, practice patterns are evolving. Meta-therapy and motivational interviewing are used in voice therapy to guide discussions that will optimize social cognitive factors to improve adherence and ultimately therapy outcomes. It is important to identify specific vocal hygiene targets to promote self-efficacy rather than providing a long list of dos and don'ts that may be overwhelming and undermine change. Based on the current literature and clinical experience, key considerations include monitoring both systemic and surface hydration, maintaining awareness of key signs and symptoms of LPR with keen attention to timing of symptoms to aid in differential diagnosis, avoiding phonotraumatic patterns, and learning how to pace voice use when high-impact vocal behaviors are required. Complete voice rest is better suited to treat acute injury or as a diagnostic tool and is not practical for management of day-to-day vocal demands. With this guidance in mind, identifying the most impactful vocal hygiene targets should be patient-driven and ultimately empower them to successfully implement techniques that will promote prevention, rehabilitation, and life-long vocal health.

## Declarations

**Conflict of Interest** Sarah L. Schneider receives royalties from Med-Bridge. Zoe Weston has no competing interests to declare.

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

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