The 2016 G. Paul Moore Lecture: Lessons in Voice Rehabilitation: Journal of Voice and Clinical Practice

*,†Mara Behlau, *†São Paulo, Brazil

Summary: This Paul Moore Lecture honors the contributions made by authors to the *Journal of Voice* during a period of 30 years, from 1987. Fifty articles were selected and included under the following five topics: (1) normalcy of the larynx and voice; (2) the clinical speech-language pathologist's evaluation; (3) the patient's perspective; (4) the core of vocal rehabilitation; and (5) behavioral *versus* organic dysphonias. The analysis reflects a vivid landscape of the specific area and significant advances in knowledge. It also shows the valuable interdependence between science and clinical practice. The topics highlight the following information: (1) The physical appearance of a healthy larynx varies across individuals with normal voices. (2) The voice is not a binary descriptor (normal *versus* abnormal) but a variable measure, with many cultural influences on the perceptual auditory analysis of a voice. (3) The clinical speech-language pathologist assessment is multidimensional and multiparametric, with both subjective and objective analyses. The patients' opinion about the impact of a voice problem on his or her quality of life is significant when proposing a treatment. Therefore, it is also included in the initial assessment. (4) Vocal rehabilitation is a nonlinear process that combines direct and indirect approaches. Evidence of the positive effect of voice therapy is now well established. (5) Behavioral dysphonias may be linked to self-regulation of the use of voice and this needs to be taken into consideration. Although organic dysphonias are not necessarily the result of harmful vocal behaviors, they too can benefit from vocal rehabilitation.

Key Words: Voice−Dysphonia−Larynx−Treatment−Vocal rehabilitation.

INTRODUCTION

The G. Paul Moore Lecture is one of the most anticipated presentations at The Voice Foundation Symposium: Care of the Professional Voice. This lecture is an honor given annually to a voice scientist, clinician, or singer to recognize their achievements in the field of voice. Dr. Paul Moore, an icon in the voice field and a professor emeritus of the University of Florida, Department of Communication Science and Disorders, was a major inspiration to all professions related to the care of the human voice. His intense and warm presence, precise wording, and superb listening are still vivid in our memory and particularly in mine. He fascinated me.

After enjoying this annual presentation from the front row year after year, I was asked to deliver the Lecture in 2016. This was an immense honor that I was delighted to accept, even though I was fully aware of the challenges that I would face. I was ready to walk in the shoes of my predecessors and take the risks that preparing and giving the Lecture entailed!

My first concern was to carefully select the topics that I would share with my colleagues. Early in the process, I realized that it would be more interesting to reflect on what influenced me the most after more than 30 years of participating in The Voice Foundation Symposium. Therefore, I decided to explore my own trajectory as a clinician and what influence The Voice Foundation had had on my clinical practice. I decided to review the volumes of the *Journal of Voice*. This soon proved not to be a single-person task as I had naively expected. With the diligent help of the devoted and knowledgeable team of assistants at the "Centro de Estudos da Voz"—CEV, in São Paulo, Brazil, I reviewed the collection of 30 years of publications, with the goal of selecting the 10 most influential articles in the five areas of clinical care. Both the excitement and the anxiety associated with this enormous task were noticeable among us. With this well-defined goal in mind and, admittingly some lack of control, I reached the impressive result of identifying a total of 50 articles and not just 10!

This group of articles led me to reflect on my professional daily routine and how over time it changed my practice and the practice of my students both at CEV and at "Universidade Federal de São Paulo—Escola Paulista de Medicina"—UNIFESP-EPM, São Paulo, Brazil.

The 50 articles were organized in the following five main topics: (1) normalcy of the larynx and voice; (2) the clinical speech-language pathologist's (SLP) evaluation; (3) the patient's perspective; (4) the core of vocal rehabilitation; and (5) behavioral *versus* organic dysphonias. The list of authors and the years of publication are presented in Appendixes 1−5 and organized by topics and by the most important lessons learned. Comments about the impact of each article are included throughout the text. Other references were used and incorporated to substantiate and amplify the topics. These additional references are inserted between brackets.

FIVE MAIN TOPICS

Normalcy of the larynx and voice

The first topic is normalcy of the larynx and voice because this is usually the first clinical concern when an individual comes with a voice complaint. There is no clinical consensus, neither on the concept nor on the terminology related to normal or dysphonic voices. Early in my career and under the guidance of my dissertation director Professor Paulo Pontes, we soon

Accepted for publication February 22, 2018.

From the *"Centro de Estudos da Voz" - CEV, São Paulo, Brazil; and the †"Universidade Federal de São Paulo—UNIFESP", São Paulo, Brazil.

Address correspondence and reprint requests to Mara Behlau, CEV—Rua Machado Bittencourt 361, 10th floor, São Paulo, 04044-905, Brazil. E-mail addresses: mbehlau@uol.com.br, mbehlau@cevbr.com.br

Journal of Voice, Vol. 33, No. 5, pp. 669−681
0892-1997

https://doi.org/10.1016/j.jvoice.2018.02.020

realized that dysphonia was not solely a laryngeal and voice problem but also a communication difficulty: "Dysphonia is any difficulty in oral communication that prevents natural voice production."[1] Even if this definition still stands nowadays, an important element is missing. Specifically, in addition to affecting communication negatively, a vocal problem has a negative effect on one or more aspects of an individual's quality of life! It was clear that voice deserved its own field. This was elegantly exposed by Titze[2] in his seminal work, when he presented a proposal for a formal academic training in voice, called Vocology, which was the science of voice disorders and vocal rehabilitation. It was proposed early that professionals dealing with individuals with voice issues, regardless of their academic background, needed to receive a proper education and clinical training to become vocologists. Moreover, voice is a cultural construct and it seemed very useful to work on a consensus on the terminology, for both normal and deviated voices, to facilitate communication among scientists, clinicians, and surgeons all over the world. Many elegant attempts were presented in the literature and even if no one has fully succeeded yet in proposing a unanimously agreed upon terminology, the precision of the terms that we currently use has significantly improved. Sonninen and Hurme[3] explored the challenges associated with the establishment of a scientifically accurate, internationally recognized, multilingual terminology to describe the voice. They presented solutions based on two strategies: consensus and dictation.

The normal, symmetrical, and perfectly designed larynx exists only in scientific drawings. The clinical reality shows a different picture and we rarely encounter an ideal larynx in the voice clinic. A symmetrical larynx is only a didactic concept. Many professional voice users, with beautiful normal and supranatural voices, surprise us with an asymmetrical larynx. This major understanding of variations in the normal anatomy and physiology was documented and published by Casper et al[4] in the very first volume of *The Journal of Voice*. From the pharyngeal wall to the arytenoids area, large anatomical and functional laryngeal variability were observed in individuals with normal voices. At the time, this information was novel. It gave me a sense of comfort as I looked at anatomical variations in individuals with normal voices and to perfect laryngeal anatomy in individuals with voice disorders. But there remained a dilemma associated with the sound of voice.

Specifically, what is considered a normal voice? There is no simple answer to this question. The voice cannot be described in a binary fashion, such as with "yes" or "no." Moreover, the voice is a perceptual phenomenon and understanding this aspect is crucial to understanding the voice. To a certain extent, voice analysis can be compared with measuring weight and height: is a weight of 152 pounds too much, too little, or normal? As we know, it all depends on many factors, such as age, gender, height, and ethnicity. Furthermore, the professional occupation of the voice user and the way the voice is used, whether it is for artistic purpose or not, also has an impact on the judgments made about the subject's voice. Similarly, when only the sound of a voice is presented to a listener with no information about the speaker, it can be subject to misinterpretation. Our voice changes continuously throughout life and there are many physiological manifestations associated with the normal aging process that we still do not fully understand, even though we accurately perceive age in the voice, as described by Linville.[5] Therefore, besides gender, the age of the speaker is also an important factor that needs to be taken into consideration when analyzing a voice.

The voice is fundamentally a complex perceptual phenomenon. Thus, perceptual-auditory analysis is the most natural and possibly the best strategy for assessment. It usually includes three levels of analysis: (1) presence of deviation (normal *versus* altered) perceived by the ear; (2) type of alteration, such as roughness, breathiness, or strain; and (3) degree of deviation from mild to extremely severe. The context in which this analysis occurs is crucial, and even if there are many limitations associated with perceptual nature of the voice analysis, one can improve the results by controlling samples, tasks, training the listeners, and carefully defining vocal parameters. Perceptual analysis is a huge challenge. Perceptual training can help, but the listener's inner references will always play a role, as demonstrated by Fex.[6] As a result, we will never quite overcome this auditory perceptual dilemma. However, we can reduce and control for the variability typically found in perceptual evaluations. Moreover, considering different cultures and languages, the limits between normal and non-normal voices, considering a 100-point visual analog scale, may vary. This has received attention only recently (11-point cutoff value for Americans,[7] 34-point cutoff value for Finns,[8] and 35.5-point cutoff value for Brazilians[9]).

Moreover, besides the effect of culture on both the speaker's voice and the listener's perception of the voice sample, the other important influence that must be considered is the environment in which the listening task is performed. The clinical setting is very different from the researcher-subject dyad present in the research laboratory. The research article by Solomon et al[10] caused a significant impact on my practice because their findings demonstrated that research and clinical conditions are not equivalent to perceptual analysis of the voice. They analyzed clinical bias and provided recommendations to avoid such bias. Clearly, standardized protocols are needed.

Moreover, the voices of artists, such as singers, are special and should be analyzed using a different framework. Normal limits for singers can vary from typical voice users, as Sundberg[11] taught us; special demands change voice usage patterns such as vocal effort and flexibility of phonation. Actors can teach us a lot, particularly on vocal behaviors known to contribute to injuring the larynx and the voice and on strategies to protect the larynx and the voice. Roy et al[12] clarified that vocal extremes are part of some professional expressions, and the professionals using such vocal behaviors can be successfully trained to avoid harm to their larynx. Special training can increase the range of vocal expression to include extreme vocal behaviors. Instead of the classical "do" and "do not do this and that," the new era of "do it right" had begun.

Another important group of voice users are teachers. They have been the largest group of clinical subjects and patients

for a long time. It is a population that needs our help the most because of either their lack of voice training or the challenging working environment. Rantala et al[13] explained the unique combination of high vocal loading and negative working environment that teachers face. The more we understand this problem, the better we can help teachers be aware of vocal symptoms and seek help as soon as possible. The voice changes during the day, and it is difficult to separate the normal process of adaptation because of loading from the early signs of vocal fatigue.

The articles related to this topic are listed in Appendix 1.

The clinical speech-language pathologist's evaluation

The SLP who specializes in voice disorders brings to the voice evaluation a different perspective from that of the physician. The voice consultation is a five-step sequence, consisting of the history of the case and vocal behavior data, the self-evaluation of the impact of the voice problem, the acoustic and perceptual-auditory analysis, the examination of the patient and, finally, the correlation of all this information with the laryngeal examination and medical diagnosis. Unless otherwise indicated, I learned early on to avoid accessing the laryngeal examination before seeing the patient. Sight is a superior sense. Seeing a larynx with a lesion or an obvious movement problem before analyzing functionality may contribute to amplifying the awareness of the voice problems that the ear perceives. Any voice assessment should be considered completed only when the information from the following three sources has been obtained: the patient, the SLP, and the physician. One should avoid judging the voice only with the laryngeal status or only with a voice sample. A deviated voice can be a vocal style and produced by a larynx that is free of lesions and that has no limitation in muscle movements. Moreover, we should have in mind that professional voice users, whether they are artists or not, are unique in their demands, and all information has to be analyzed and later judged with caution.

Voice quality analysis and the patient's self-perception evaluation are always key components of the SLP evaluation. However, the acoustic analysis, which provides a more objective component of the evaluation, has gained popularity. One important point, highlighted by the survey conducted by Behrman,[14] is probing the patient's ability to alter the voice production during the assessment session. This aspect of the clinical evaluation highlights, once again, that functionality is central when analyzing a voice problem. Moreover, the clinician's and the patient's perspectives are unique and do not necessarily correlate strongly as the experience of living with a voice problem is quite individual and can be understood only by using the patient's own report on his or her condition. As stated by Karnell et al,[15] because the clinician's and patient's perspectives are different, both sets of information must be considered, and measurements must be well documented.

Technological advances have been remarkable during the last three decades, and a clinical voice laboratory, a sophisticated system previously available only in university clinics and centers, is now widely used by the modern clinician in most countries. Sataloff et al[16] commented that a reliable and objective analysis of the larynx and voice is as important to the laryngologist as the audiometry is to the otologist. This article announced that a new era of instrumentation and low-cost software was starting. However, no single technological advancement would surpass the importance of understanding the interdependence of the laryngeal muscles in different vocal tasks as elegantly presented by Hirano.[17] He observed muscle behaviors in various registers, warm-up exercises, phonation modes, vowels and phrases, and non−singing behaviors of the famous singer and teacher of singing William Vennard using electromyographic data; he presented the interdependence of muscle function information to the scientific and clinical world.

The voice is not only mucosa and muscles. It is also influenced by the complex hormonal mechanism, particularly for the female voice. Abitbol et al[18] explained how estrogen, progesterone, and testosterone affect our mood, energy, libido, brain, and voice. As we conduct the voice evaluation, it is important to know in which part of the menstrual cycle the patient is on the date of the laryngeal assessment and the follow-up consultation. Female hormones must be taken into consideration when analyzing the female voice as they are the dominant factors that influence the quality of the voice throughout their lifespan.

A final comment on the SLP evaluation is related to the risk of working only with partial information in the presence of a voice complaint. Regardless of the nature and the severity of the vocal complaint, no patient can be sent into rehabilitation without a complete laryngeal medical examination. SLP are health professionals, and patients' health and safety come first.

The articles related to this topic are listed in Appendix 2.

The patient's perspective

The patient's perspective should always be taken into account. This includes their self-assessment, adherence to treatment coping techniques, and self-regulation strategies.

If a patient indicates that the voice disorder is not a problem, he or she will most likely not adhere to treatment. Self-assessment protocols are questionnaires that explore different aspects of the impact of a voice problem on the patients' life such as changes in vocal activities or participation in social events. These self-assessment questionnaires have completely changed the clinical voice scene. There are many options available to the clinician to assess the voice based on the patient's complaint and the etiology of the voice disorder.[19] These options include the Voice Handicap Index (VHI), the Voice-Related Quality of Life, the Voice Symptoms Scale, the Vocal Activity and Participation Profile, the Vocal Performance Questionnaire, the Voice Handicap Index for Singing, the Classical Singing Voice Handicap Index, and the Modern Singing Voice Handicap Index. The lessons learned from Hogikyan and Sethuraman[20] were that measuring the impact of the problem, the magnitude of the voice-related impact on the patient's life, and the outcome following treatment were as important as quantifying the dysphonia. Furthermore, there is not always a

direct relationship between the vocal deviation and the self-assessment of the problem. For example, a patient with a moderate to severe vocal deviation following a surgery for laryngeal cancer may be less inconvenienced than a singer with a vocal fold polyp. Dr. Hogikyan taught me to assess the impact of a voice problem and helped my group with the validation of the self-assessment protocols in Brazilian Portuguese. Thanks to his generous guidance, I gained a deeper understanding of the patient living with a voice disorder.

Despite all the criticism because of the faulty process in the conceptualization and development of the many self-assessment instruments that measure the impact of a voice disorder, which was superbly discussed by Branski et al,[21] it is not possible to deny the advances achieved with self-assessment protocols. Although that article gave me a scientific discomfort, the reflection it sparked doubled its value. And, after the profession learned how to measure quality of life, handicap, and vocal symptoms using the information provided by the patient, researchers moved toward the understanding of other aspects of the voice, such as the complex and multifaceted clinical phenomenon of vocal fatigue, as presented by Welham and Maclagan[22] in an extensive review of the literature.

More recently, Nanjundeswaran et al[23] proposed a new index called the Vocal Fatigue Index. It has 19 statements and three factors (tiredness of the voice and voice avoidance, physical discomfort, and improvement of symptoms with rest). Thanks to this new index, I expect we will make progress in prevention, with the early identification of vocal fatigue symptoms and proper management, and treatment. Vocal fatigue can be detrimental to the use of voice and communication and what we currently know is not enough to deal with patients who present with symptoms of fatigue, predominantly in the case of professional voice users.

The second item taken from the patient's perspective is adherence to treatment. There are several proposals in the health behavior literature, but the integrative and biopsychosocial transtheoretical model[24] fits properly in the field of voice. This model does not recommend any particular approach but provides a framework for understanding and facilitating behavioral changes. Van Leer et al[25] introduced the transtheoretical model in the voice area and explored the temporal dimension of behavioral changes in the voice through a series of stages: precontemplation, contemplation, preparation, action, maintenance, performance, and termination. The readiness for change was reinforced as the right attitude to engage in behavioral treatment. It has been observed that when a patient is not at the proper phase to achieve changes, low adherence, frustration, and lack of results ensue. Only 20% of the population at risk are in the preparation stage. This means that we may have enrolled patients in treatment at a time when they are not quite yet ready to make a commitment.[26] The findings outlined in the article by Van Leer et al[25] made so much sense in my practice that I became involved in the adaptation of an instrument to measure the stage for change, the so-called URICA-VOICE.[27]

Finally, regarding coping and self-regulations strategies, it is known that the way a person deals with a problem can cause a more negative impact than the problem itself. Coping is the way someone deals with problems. It includes strategies to adapt to adverse or stressful situations. In simple words, it is the process of managing taxing circumstances. Coping is different from defense: defense is automatic, and it uses rigid and unconscious mechanisms; on the contrary, coping requires evaluation and it is related to self-regulation. Coping can be active or passive and it is particularly relevant in evaluating and treating patients with behavioral dysphonias. Coping strategies and the individual's personality may contribute to the development of benign laryngeal lesions because of phonotraumatic behaviors. Patients with vocal problems use more emotional coping strategies than cognitive ones, as shown by Hugh-Munier et al.[28] Therefore, an important role in the therapeutic process is to help the individual change his or her perception of the problem and to use more rationale-based strategies instead of emotional ways of coping with the stressful situation. During the vocal rehabilitation process, dysfunctional coping strategies can be replaced by ones that are more appropriate, resulting in a better treatment outcome.[29]

Finally, self-regulation is related to adherence and coping, and it is considered synonymous with self-control, an important aspect of the pre-frontal cortex executive functions. The ability to voluntarily control thinking and behavior is a central construct in learning and behavior change. Self-regulation is the inner strength to use resources capable of inhibition, undo or change physiological processes, as well as many kinds of habits or learning skills. Vocal behavior is usually deviated in nonorganic dysphonias, and the quantity of use and intensity of the voice have been traditionally recognized as an important leading cause of voice disorders.[30–32] Self-regulation plays a role in mastering new skills, such as the ones we teach in voice therapy. The concept of self-regulation of the voice was recently introduced by Vinney and Turkstra.[33] These authors wisely proposed that the self-regulatory capacity be involved in both recommending voice therapy and planning the rehabilitation itself. Besides self-regulation, perceived control is the basis of self-efficacy and has a major influence in treatment outcome. Misono et al[34] have recently shown that low perceived control is related to more distress and a larger vocal handicap; in addition, the relationship between distress and vocal handicap is moderated by perceived control. The interesting point is that perceived control is different from real control and this perception can be used in vocal rehabilitation. The therapeutic setting has to improve the patient's ability to control his or her voice to reduce stress. Individuals with vocal symptoms may have a lower level of self-regulation compared with those without vocal symptoms. Problems with impulse control and goal setting may limit therapeutic development and results.[35]

Dropping out cannot be underestimated, and predictable variables need to be determined, starting from the otolaryngologist's referral to the completion of the therapy. Like in other behavioral interventions, the percentage can be as high as 65%, as pointed out by Hapner et al.[36] Factors such as gender, age, ethnicity, severity of the vocal deviation, perceived disadvantage, and diagnosis were not predictive of dropping out of treatment.

Finally, the greatest lesson from self-assessments: use your evaluation to direct the rehabilitation toward improvement. Above all, consider the patient's self-assessment and do not underestimate adherence and coping strategies.

The articles related to this topic are listed in Appendix 3.

The core of vocal rehabilitation

Vocal rehabilitation is a nonlinear process, based on the patient's assessment of his or her voice problem and the many possible consequences on the quality of life, social interactions, or professional development. There are two main basic options of intervention for rehabilitation: (1) to act on specific aspects, such as pitch, loudness, resonance, and vocal quality or (2) considering the solidarity of the subsystems of respiration, phonation, and resonance, to work on altering these subsystems. The main goal of vocal rehabilitation is to improve communication as a tool for interpersonal relationships.

When treating a patient with a voice problem, clinicians face many challenges, such as the diversity of cases, which may vary from purely behavioral dysphonias, with or without benign lesions, to purely organic disorders, such as endocrinological, neurologic, or cancerous lesions. Moreover, purely functional cases with an emotional basis such as conversion aphonia, mutational falsetto, or breaks between registers during speech add a diversity of clinical presentations. The voice clinician has to develop and show scientific competence and cultural understanding to appreciate different vocal, artistic, and nonartistic expressions and to decide what is good or bad for the voice.

To improve the practice, the SLP voice specialist must borrow information from several disciplines (voice science, otolaryngology, psychology, and speech-language pathology) as was recognized early on by one of the icons of our field, Boone.[37] Even if this may bring some complications because the profession can be perceived as non-pure regarding its knowledge, such eclecticism does not constitute a lack of consistency, as the author clearly stated. Actually, it is a natural flexibility required in our field and we obtain coherent results when we submit our clinical observations and experimental data to critical discussions and evaluations. Both The Voice Foundation Symposium and the *Journal of Voice* have served this goal of disseminating the results obtained with vocal rehabilitation.

This flexibility in our field has led us to give proper attention to the commercial contemporary music, as named by Lovetri and Weekly,[38] as a style worthy of serious research and specialized training. It is this specific article that led many of the SLP professionals to reflect and review our practice with these singers. The objective was to offer them a specialized voice therapy approach that would take into account their specific needs. It is important for the therapist to be aware of and to understand the different ways of expressing emotions through singing. In this way, the therapist can adapt the therapy to the singer's voice problem, as well as to their vocal style. Here, once again, a multidisciplinary approach helps to open the mind when treating these individuals and it is the best approach to treatment.

Voice rehabilitation implies the presence of a voice disorder, whereas vocal training is directed at improving the performance of a normal voice. SLPs and teachers of singing can learn from each other, which ultimately benefits the individual who seeks their expertise. Is there a place for SLPs in vocal training? Yes! A physiologically oriented training program, customized conditioning programs, vocal warm-ups, and cool downs are a few strategies that can be incorporated into the vocal training program.

Warm-ups and cool-downs have brought attention to the methods of how to condition the voice. The variability of effects after warming up the voice before a performance, as shown by Elliot et al,[39] led us to the conclusion that customized programs, even if they are not practical, may be a better answer to this issue.

Clinicians in more than 30 countries[40] use their own version of exercises to improve the voice resonance of their patients. The popularity of humming and nasal sounds sequences is owing to the fact that a specific laryngeal configuration is obtained with this exercise. The *quasi* ABDuctor or ADDuctor laryngeal configuration, as determined by Verdolini et al,[41] seems to offer the best vocal results, and it is easily achieved by a resonant voice, regardless of the vocal health condition. Producing nasal sounds is fundamental to vocal rehabilitation.

Historically, vocal rehabilitation is a combination of arts (mainly singing) and science. My generation of clinicians has witnessed a huge evolution from an abstract form of intervention to a more scientific approach, particularly with the use of the laryngeal endoscope and low-cost acoustical analysis. During my college years, even though I was interested in the human voice, it was difficult to imagine myself in the field because it was mostly abstract and intuitive and therefore difficult for the pragmatic person that I am to understand. Nowadays, the scenario has completely changed, and the voice field is well established as a science. Good reviews on the progress regarding the voice and voice therapy make us understand what has been accomplished so far and what still needs to be done, including correcting methodological problems and understanding how efficient different treatments are.[42,43]

Vocal rehabilitation is a complex nonlinear process of behavioral changes to improve voice, muscle adjustment to achieve balance, or vocal self-image to conquer a vocal identity that represents the self. Therapeutic intervention in many clinical cases mostly seeks to improve vocal behaviors and self-control, like in pediatric dysphonias. Other treatments work on the vocal muscles such as in functional aphonia or on self-identity such as in the case of the transgender patients. More challenging cases may involve all of these aspects.

The main challenge for the SLP voice specialist is to carry out an effective treatment using the best available scientific evidence. The efficacy of our services is often under scrutiny. Stemple et al[44] were pioneers in measuring the effects of a well-designed, simple, and structured rehabilitation program, the Vocal Function Exercises. They have inspired the whole field in searching for and identifying the active ingredients in voice therapy. Indeed, their seminal research motivated my group to develop two randomized clinical trials.[45,46]

Three aspects of vocal therapy have always intrigued me: indirect *versus* direct approaches, regular *versus* intensive regimen of treatment, and programmatic *versus* custom-made therapy. Vocal rehabilitation acts on vocal functionality and it can be done via direct voice therapy, which means using physiological maneuvers to achieve changes. Direct therapy has produced significant scientific evidence.

Alternatively, vocal rehabilitation can be done via indirect vocal therapy, with a series of tools to modify cognition, behavior, and the environment in which the patient uses his or her voice. Indirect approaches are seldom used alone. Indirect approaches include stress management and coaching strategies, relaxation techniques, counseling on voice usage and vocal hygiene education, and evaluating environmental aspects such as room acoustics. Because voice production is rather an abstract phenomenon to the average individual, providing the patient with simple and clear information often makes a significant difference in outcome. Bibliotherapy is an old concept and several materials can be very useful for educating patients, but they are not a substitute for a clinician. Like in other areas, popular knowledge on voice care may differ from the clinicians' opinion and available scientific data. The development of a Voice Care Questionnaire by Fletcher et al[47] was a well-designed process to produce a useful tool to guide the indirect approach.

Direct approaches represent almost three-fourths of the therapy session, and indirect approaches are more individualized, as revealed by the interesting contribution of Gartner-Schmidt et al.[48] This see-through article showed that most of our direct approaches have a positive impact on many types of voice disorders. However, even if this is probably true in many clinical settings, the way a particular approach is introduced and adapted to a patient can differ according to the diagnosis.

Over the years, intuition on the effect of a voice exercise has been replaced by the understanding of the underlying laryngeal physiology, as presented with the analysis of the prolonged version of the consonant /b:/ explored by Elliot et al.[49] Both the physiology of vocal exercises and their impact on the voice must be understood in rational terms and not only on an intuitive basis.

The more we understand the mechanisms involved and the less we argue on terminology benefits not only the field of voice but also all of its stakeholders. This has recently happened to the controversial notion of vocal registers, revisited as laryngeal vibratory mechanisms by Roubeau et al.[50] The controversial terminology of registers was replaced by the notion of four vocal mechanisms, labeled as M0, M1, M2, and M3, with transition zones between them. All of these registers are present in both genders as well as in trained and nontrained singers. Perception is usually the vocal pedagogy perspective when categorizing register, which always caused confusion. As an alternative view, the authors prefer to focus on the mechanisms involved in the registers. So, the traditional notion was revisited, and clinicians and voice pedagogues can be more confident when proposing specific vocal exercises. Specifically, vocal rehabilitation programs and custom-made approaches may follow two possible routes to travel. The choice depends on many factors related to the pathology or disease, clinical setting, the clinician's background, experience and maturity, the presence or absence of autonomy in selecting therapy, the academic tradition, and the patient's personality and behavior. A patient-oriented vocal rehabilitation can also include a health problem-focused voice therapy. Both aspects need to be considered, and a good strategy is to act on functionality.

Clinicians from different countries and cultural traditions have their unique way of dealing with patients with voice disorders. For me, the vocal rehabilitation process is like a tripod, consisting of vocal counseling, vocal psychodynamics, and vocal training.[1] There are variations of these three types of approaches as shown in many textbooks published all over the world. Vocal counseling is related to vocal hygiene, such as hydration, tips for vocal endurance, behavioral strategies for dealing with stress, and development of self-control and more adaptive coping approaches. Vocal psychodynamics is related to the impact of someone's voice on others and provides valuable insights on the reasons and needs to change one's voice. Finally, vocal training consists mostly of exercises to change vocal output, to find alternative routes for production, to modify vocal gestures, and to achieve a better source-filter interaction.

Practical experience may be distant from laboratory research on voice methods. Clinicians frequently combine several methods for an individual. Certain patients' variables, such as movement restriction, state of mind or mood, and learning ability, seem to influence this process more than the type of voice disorder or the method itself. The article presented by Burg et al[51] offers a variety of direct voice therapy methods used in Germany, Switzerland, and Austria, many of them not known outside of German-speaking countries. The opinion offered by our German colleagues that the scientific evaluation of single methods does not correspond to the "real clinical life" is quite thought-provoking and challenges us to design experiments that replicate the practical experience.

On the other hand, some specific techniques have defined patients—but this seems to be an exception. This is the case for the Manual Circumlaryngeal Therapy or the Laryngeal Manual Therapy, which have both had immediate large positive effects on the treatment of patients with muscle tension dysphonia, as shown by Roy et al[52] and Mathieson et al.[53] Even if applied with different characteristics of manipulation (one or two hands, soft or deep handling, with or without vocalization), results presented are remarkable and happen shortly after the beginning of the therapy.

Vocal exercises are usually abstract for patients and visual feedback, through endoscopy or spectrographic tracings, can accelerate the rehabilitation process and make it more efficient than using the traditional approach as demonstrated by Rattenbury et al.[54]

New possibilities, such as acupuncture, have also found a place in the *Journal of Voice*. Yiu et al[55] developed a randomized trial using intensive acupuncture therapy in patients with benign vocal lesions. His team showed improvement in all three areas of assessment, that is, quality of voice, acoustic analysis, and quality of life. We do need to know more about

alternative methods to treat voice disorders and submit these approaches to rigorous assessment.

There are two basic options for the treatment regimen: regular and the intensive treatment. The regular regimen, with one or two sessions a week, is more adequate when seeking long-term goals, with more stable results and when progressive learning is needed. On the other hand, an intensive program can be more effective when short-term goals are clear, with specific purposes or when dealing with severe cases. An example of this intensive therapy is the voice rehabilitation following an aggressive surgery for patients with severe structural alterations, that is, sulcus vocalis. The surgery for this intense vocal deviation was named slicing mucosa technique, as proposed by Pontes and Behlau,[56] and requires an intensive approach to recover tissue elasticity. The use of an intensive therapy to deal with a complete aphonia after surgery was an intuitive tactic that helped optimize the healing process and make the scar tissue more flexible after the aggressive surgical approach. I included this article that I coauthored in the series of the 50 most influential manuscripts, not because it is a good example of intensive rehabilitation after laryngeal surgery, but because I was encouraged to publish the manuscript in the *Journal of Voice* (from an anonymous reviewer who I later found out was Professor Sataloff). This inspired me to start writing in English and motivated me to urge my students to write in English, even though it is not their native language.

Intensive intervention was formally presented as a novel approach for treatment of patients with hypokinetic dysarthria because of Parkinson disease. The Lee Silverman Voice Treatment for patients with Parkinson disease is an excellent example of intensive training with 16 one-hour sessions, four times a week. It has produced the best scientific evidence of the effectiveness of vocal rehabilitation, as presented in one of the early articles using this method of vocal rehabilitation by Smith et al.[57] The method focuses on phonatory effort and changes not only the quality of voice but also the adduction of the vocal folds even in the presence of a progressive neurodegenerative disorder.

The intensive approach, the so-called Boot Camp, as proposed by Patel et al,[58] uses information from neurobiology, exercise physiology, motor learning theory, and psychotherapy to produce learning and behavioral changes. The authors propose one to four successive days with different therapists and simultaneous methods and an average of 5 hours per day of rehabilitation. The intensive approach is gaining popularity for difficult voice cases. The results obtained after 1 week of intensive intervention match those following a 2-month program of regular therapy. This publication made me think about our more than 20 years' experience with the intensive regimen. Subsequently, I published our perspective on the efficacy of intensive treatment for professional voice users presenting with a vocal emergency, patients with vocal fold scar or iatrogenic dysphonia, patients who did not obtain satisfactory results with traditional methods, and patients located in geographical areas where voice specialists are not available.[59] Of course, the health safety of the patient is crucial. However, we still know relatively little on the most appropriate and effective amount of exercises. This is an area of investigation that needs to be explored as it holds important clinical implications.

Performing vocal exercises during the acute phase, as proposed by Branski et al,[60] allows behavioral agents to advance the wound healing of the vocal folds. Controlled studies demonstrated that selected vocal exercises may attenuate inflammation, as presented by Verdolini-Abbott et al.[61] Their study showed that some forms of tissue mobilization, with low-impact vocal fold exercises, such as the ones included on resonant voice techniques, may attenuate the key markers of tissue injury and inflammation. Moreover, after an extensive and informative review of the clinical and basic science literature, Ishikawa and Thibeault[62] affirmed that controlled exercises can indeed be beneficial instead of long-term vocal rest. This novel approach can be interpreted as a change in paradigm.

Therapy is usually delivered in individual treatment sessions. However, group therapy is an interesting option, not only owing to economic reasons but also because of the communication advantages it offers. Law et al[63] highlight the many clinical and psychosocial benefits and the wise allocation of health resources such as option offers. They also introduced the concept of group climate where "engaging" is preferable to "conflicting" or "avoiding" to obtain positive treatment outcomes.

Regarding the duration and frequency of sessions, the article by De Bodt et al[64] offers a frame of reference as they described vocal rehabilitation throughout the world. This study reviewed not only articles but also scientific textbooks. It concluded that voice therapy lasts an average of 9 weeks, 10 sessions, which are between 30 and 60 minutes each, with a frequency of once or twice a week.

The articles related to this topic are listed in Appendix 4.

Behavioral *versus* organic dysphonias

Two different etiologies of voice problems need to be didactically considered because they require different treatment approaches: behavioral and organic dysphonias. What separates one category from the other is the role of the vocal behavior as the origin of the voice problem.

Vocal behavior can be defined as the set of vocal reactions in response to interpersonal relationships in the environment in which the individual lives. Such vocal reactions can be the result of the individual's psychological needs, habits, social stimuli, or a combination of these. The vocal behavior may also be a specific emotional manifestation of professional voice users or even constitute a vocal style in certain artists such as singers and actors. Patterns of vocal behaviors are also common in nonartistic professional voice users, such as teachers and preachers.

The term for dysphonia that stems from inappropriate voice usage is behavioral dysphonia. This type of dysphonia is highly prevalent in voice professionals. When the vocal behavior is not involved as an etiological factor, the dysphonia resulting from injuries to the muscles or nerves that control phonation is called organic dysphonia. Therefore, the vocal behavior during communication does not always play a role at the beginning of

a voice problem, but it influences the vocal behavior as an etiological or maintenance factor. Behavioral dysphonias can be related to speech usage in occupational and non-occupational activities. An instrument to analyze the levels of speech usage was proposed by Anderson et al.[65] It is called the Level of Speech Usage Scale. This instrument helps characterize the speech patterns of patients with behavioral dysphonias. It classifies speech activities into five groups: undemanding, intermittent, routine, extensive, and extraordinary. This information is useful to understand what people want or need to do with their speech to meet the communication demands they face both in their personal and professional lives.

There are five main strategies that help individuals with a behavioral dysphonia: (1) replace phonatory traumas with more adequate vocal manifestations or habits; (2) immediately identify a high-impact exercise and show the patient how flexible the voice can be; (3) share with the patient concrete data that show vocal changes; such data can be a recording of pre- and post-speech exercises or a spectrogram; (4) make the patient responsible for his or her voice by stressing the importance of his or her active participation in the rehabilitation process; and finally, (5) motivate the patient by eliminating potential doubts associated with the therapy process and by proposing few but powerful exercises for home training.

If the patient is resistant to changes, coaching strategies can be used to bring awareness and make the patient responsible for his or her own outcome. Voice therapy is not coaching, but the use of coaching questions can be of immense value in providing the patient with an active role. Some useful questions when there is resistance or non-adherence to the treatment are: How important to you is it to have a good voice?; How would you feel if your voice were good?; Since when do you want to change your voice?; From 0 to 10, how motivated are you to change your vocal habits?; From 0 to 10, how much does this vocal problem bother you?; What do you think can be done to help you with the therapy?; What options are there when you do not have time to do the exercises?; What have you not tried yet to improve your voice?, etc. Simple and direct questions that bring reflection and cannot be answered just by "yes" or "no" may add important data that contribute to improving the quality of the vocal rehabilitation.

It is important to recognize that even if occupational demands are highly linked to voice problems, it is inadequate and risky to systematically associate vocal folds lesions of professional voice users with their vocal technique. Their lesions are not always the side effect of vocal strain, as emphatically described by Cornut and Bouchayer[66] in one of the early volumes of the *Journal of Voice*.

Organic dysphonias are voice problems not related to the vocal behavior. This etiological group encompasses many voice problems such as congenital voice disorders, endocrinological cases, various syndromes, neurologic problems, systemic diseases, and cancer of the larynx, among others. Vocal fold paralysis and scar cases are some of the most common in typical clinical practice. For these cases, the most important strategies are (1) Help the patient understand his or her specific condition; (2) Work on vocal functionality and coach the patient to produce the best possible voice; (3) Encourage intensive and continuous training for a long period, if needed; (4) Recognize both changes in voice quality and comfort, which is more important than the quality itself for many patients (except for singers); and (5) Be sensitive to therapeutic limitations by monitoring progress with multidimensional analysis including auditory-perceptual, acoustical, laryngeal, and self-assessment parameters.

The plasticity of voice quality should be considered during the assessment to propose vocal rehabilitation, as Dejonckere and Lebacq[67] advocate, but also during the whole process of rehabilitation to monitor progress and decide on termination from therapy.

Finally, the clinician's and patient's personality characteristics need to be taken into account in the process of rehabilitation. The influence that each personality plays can be positive or negative. Andrews and Schmidt[68] authored one of the few articles in the field of voice that used the Myers-Briggs Type Indicator. This instrument rates the clinician's feedback, eye contact, and the amount and clarity of the clinician's explanation. Variables such as sensing-intuition, thinking-feeling, and judgment-perception do influence the relationship between clinician and patient. The role that the clinician's and the patient's personality characteristics play is usually underestimated and needs to be properly analyzed.

In conclusion, an effective voice intervention is mostly dependent on the accuracy of the laryngological examination. I would like to stress the importance of the quality of the interaction between the Medical Doctor and the SLP, as we have witnessed at the Voice Foundation Symposium year after year. Receiving accurate and complete diagnostic information (such as the presence or absence of vocal fold lesions), description of the pathology when present (configuration, size, and interference of movements), glottic and supraglottic vocal tract configuration and, if possible, laryngeal behavior during several tasks, when needed, is the right of all patients before starting rehabilitation. Particularly for laryngology for the performing voice, as presented by Guss et al,[69] the physician needs to be particularly sensitive to the patient's personality characteristics in addition to being aware of specific risks and management needs associated with this population.

The medical doctor working in laryngology, and especially in the care of the performing voice, has to go beyond the medical science and dare to study more. As the Portuguese philosopher, essayist, and writer Agostinho da Silva (1906−1960) once said: "Each person sees the universe through the limited sensitive lens of their own being; but the universe may be much broader and much different than our personal lens allows." The Voice Foundation Symposium: Care of the Professional Voice fosters professional camaraderie among the participants, which ultimately helps them broaden their understanding of the human voice. Among us, there are many physicians, voice scientists, teachers of singing, and SLPs who have dared to see beyond and that have inspired generations of colleagues to go further.

In the preface of the book *Organic Voice Disorder*, G. Paul Moore[70] wrote: "Much is yet to be learned. But there is

encouraging evidence of accelerated research on vocal disorders and on the process of phonation in laboratories in several parts of the world. As basic information accumulates, it will contribute to the fundamental premise of this book, which is that rational therapy for voice disorders must be based, whenever possible, upon experimentally confirmed physical and physiological concepts related to both normal and abnormal function of the vocal organs." This is still true, and it is my daily motto.

The articles related to this topic are listed in Appendix 5.

CONCLUSION

A selection of 50 articles of the *Journal of Voice*, from the first volume in 1987 to 2016, is offered and examined according to their impact on the SLP's clinical practice with patients with voice disorders. Articles were classified in five topics ranging from the dilemma of considering a larynx and a voice normal or not, followed by the dimensions used for vocal assessment. A special highlight was the importance of the patient's perception of his or her problem. The core of vocal rehabilitation was discussed, considering both indirect and direct approaches. Finally, the importance of understanding the influence of the vocal behavior as an etiological factor related to the vocal problem was analyzed. Significant advances have been accomplished in the area of voice evaluation and voice care. The Voice Foundation, since its founding by Dr. Moore and others, has played a critical role in fostering interactions between scientists, clinicians, and singers via the annual symposium and the scientific publication of many presentations.

Acknowledgments

The Voice Foundation has touched my team and me in so many ways that I cannot fully express. No one is the same after experiencing The Voice Foundation Symposium. I would surely be a different person if I had not had the opportunity of attending the Symposium during the last 32 years and bringing along my eager-to-learn and talented students, several of which who are now my colleagues and/or have become university professors. They are my joy, my pride, and the reason for me to keep on dreaming and working. I must acknowledge that it is they who are the source of my energy and my inspiration. It is their bold ideas that push me to learn more about the voice. Being asked to give the G. Paul Moore Lecture was a true honor I had not anticipated. Even though I was initially terrified of not being able to follow in the steps of so many who had given it before me, I was ready to meet the challenge. This presentation would not have been possible without the precious help of my colleagues and assistants at the CEV. When I met Professor Paul Moore at the Symposium, he was already in his mature years. I was immediately impressed not only by his unique cognitive intelligence, but also by his emotional intelligence. He was so much interested in what was happening in the area of voice in Brazil that I almost felt embarrassed for not having all the information he wanted. We exchanged a couple of letters and cards. His multidisciplinary approach and his clinical focus enchanted me. He always asked the right questions.

On a very personal level, my first take-home lesson in voice rehabilitation after all these years of attending the Symposium has been to not hesitate to seek the guidance of my colleagues, and specifically to discuss difficult cases with them. Therefore, I would like to express my deepest gratitude to all friends who have always patiently listened to me and who have helped me see what lies below the surface. The second lesson has been to learn to accept criticism. Americans are usually much more assertive than Brazilians are, and this was not an easy lesson to learn at first. However, I knew that to be close-minded would take me nowhere. The third lesson, and this is undoubtingly the most difficult one, has been to understand that the world does not revolve around my voice practice and me. In this regard, The Voice Foundation has been and remains a large window on the international voice scene. Therefore, I am taking this opportunity to recognize all friends and professors for their competence, influence, and all the valuable learning during these decades. I am most grateful for the immense gift of sharing our professional experiences with passion, love, and ethics at its center. I address my profound gratitude to Professor Robert Sataloff who leads the Foundation with profound dedication and to the diligent team of colleagues in his office who are always available to solve small and large practical problems. My team and I feel that Philadelphia is our second home.

APPENDIX 1: ARTICLES RELATED TO THE NORMALCY OF THE LARYNX AND VOICE

REFERENCES	IMPORTANT LESSONS
Titze IR.[2] Rationale and structure of a curriculum in vocology. *J Voice*. 1992;6:1–9.	The voice deserves a discipline named Vocology.
Sonninen A, Hurme P.[3] On the terminology of voice research. *J Voice*. 1992;6:188–193.	Terminology may never achieve consensus, but efforts need to be made for facilitating communication among centers.
Casper JK, Brewer DW, Colton RH.[4] Variations in normal human laryngeal anatomy and physiology as viewed fiberscopically. *J Voice*. 1987;1:180–185.	Variability in anatomy and physiology is the rule and does not imply a voice disorder.
Linville SE.[5] The sound of senescence. *J Voice*. 1996;10:190–200.	The voice changes throughout life and senescence is difficult to characterize.

(*Continued*)

APPENDIX 1: (*Continued*)

REFERENCES	IMPORTANT LESSONS
Fex S.[6] Perceptual evaluation. *J Voice*. 1992;6:155–158.	Perceptual evaluation is a huge challenge and training can improve results.
Solomon NP, Helou LB, Stojadinovic A.[10] Clinical versus laboratory ratings of voice using the CAPE-V. *J Voice*. 2011;25:e7-e14.	Clinical bias may play a role in observed discrepancies between clinical and laboratory ratings of dysphonia.
Sundberg J.[11] What's so special about singers? *J Voice*. 1990;4:107–119.	Singers are a unique population of voice professionals. They have different demands and show different patterns when compared to non-singers.
Roy N, Ryker KS, Bless DM.[12] Vocal violence in actors: an investigation into its acoustic consequences and the effects of hygienic laryngeal release training. *J Voice*. 2000;14:215–230.	Extreme vocal behaviors can be trained in order to avoid laryngeal injury.
Rantala L, Vilkman E, Bloigu R.[13] Voice changes during work: subjective complaints and objective measurements for female primary and secondary school teachers. *J Voice*. 2002;16: 344–355.	Voice loading is difficult to analyze, and voice features change during a working day.

APPENDIX 2: ARTICLES RELATED TO THE CLINICAL SPEECH-LANGUAGE PATHOLOGIST EVALUATION

REFERENCES	IMPORTANT LESSONS
Behrman A.[14] Common practices of voice therapists in the evaluation of patients. *J Voice*. 2005;19:454–469.	Voice therapists use subjective and objective data for defining tasks in vocal rehabilitation.
Karnell MP, Melton SD, Childes JM, Coleman TC, Dailey SA, Hoffman HT.[15] Reliability of clinician-based (GRBAS and CAPE-V) and patient-based (V-RQOL and IPVI) documentation of voice disorders. *J Voice*. 2007;21:576–590.	Clinician- and patient-based assessments use different perspectives and present low correlation.
Sataloff RT, Spiegel JR, Carroll LM, Darby KS, Hawkshaw MJ, Rulnick RK.[16] The clinical voice laboratory: Practical design and clinical application. *J Voice*. 1990;4:264–279.	The clinical voice laboratory is not exclusive of university centers and "average voice clinics" can have one.
Hirano M.[17] Behavior of laryngeal muscles of the late William Vennard. *J Voice*. 1988;2:291–300.	Patterns of muscle activities measured through electromyography are different according to the vocal tasks.
Abitbol J, Abitbol P, Abitbol B.[18] Sex hormones and the female voice. *J Voice*. 1999;13:424–446.	In addition to muscles and mucosa, hormonal factors influence the vocal quality of the female voice.

APPENDIX 3: ARTICLES ON THE PATIENT'S PERSPECTIVE

REFERENCES	IMPORTANT LESSONS
Hogikyan ND, Sethuraman G.[20] Validation of an instrument to measure voice-related quality of life (V-RQOL). *J Voice*. 1999;13: 557–569.	The importance of a voice problem can be measured by a questionnaire exploring its impact on different aspects of quality of life.
Branski RC, Cukier-Blaj S, Pusic A, Cano SJ, Klassen A, Mener D, Patel S, Kraus DH.[21] Measuring quality of life in dysphonic patients: a systematic review of content development in patient-reported outcomes measures. *J Voice*. 2010;24:193–198.	Patient's questionnaire need to be developed using rigorous guidelines and incorporate new psychometric methods to improve clinical utility.
Welham NV, Maclagan MA.[22] Vocal fatigue: current knowledge and future directions. *J Voice*. 2003;17:21–30.	Vocal fatigue is multifaceted and clinical and occupational manifestations are complex and hard to understand.
Nanjundeswaran C, Jacobson BH, Gartner-Schmidt J, Verdolini-Abbott K.[23] Vocal Fatigue Index (VFI): development and validation. *J Voice*. 2015;29:433–440.	A questionnaire to explore vocal fatigue may help spot the first signs of a voice disorder.
van Leer E, Hapner ER, Connor NP.[25] Transtheoretical model of health behavior change applied to voice therapy. *J Voice*. 2008;22: 688–698.	Cycles of change can be applied to voice therapy to improve the quality of outcomes.
Hugh-Munier CMc, Scherer KR, Lehmann W, Scherer U.[28] Coping strategies, personality, and voice quality in patients with vocal fold nodules and polyps. *J Voice*. 1997;11: 452–461.	Coping strategies and personality variables may contribute to the formation of benign lesions due to phonotraumatic behaviors.
Vinney LA, Turkstra LS.[33] The role of self-regulation in voice therapy. *J Voice*. 2013;27:390.e1-390.e11.	The cognitive function of self-regulation is probably involved in the etiology of a vocal problem and has implications in vocal rehabilitation.

(*Continued*)

APPENDIX 3: (*Continued*)

REFERENCES	IMPORTANT LESSONS
Misono S, Meredith L, Peterson CB, Frazier PA.[34] New perspective on psychosocial distress in patients with dysphonia: The moderating role of perceived control. *J Voice*, 2016, 30.2: 172–176.	Perceived control moderates the relation between voice handicap and distress and can be central in voice therapy.
Hapner E, Portone-Maira C, Johns MM.[36] A study of voice therapy dropout. *J Voice*. 2009;23:337–340.	Dropping out of vocal rehabilitation is a consistent and complex problem that deserves more studies.

APPENDIX 4: ARTICLES ON THE CORE OF VOCAL REHABILITATION

REFERENCES	IMPORTANT LESSONS
Boone DR.[37] Expanding perspectives in care of the speaking voice. *J Voice*. 1991;5:168–172.	Eclecticism in the voice clinic for speech language pathology intervention must not be seen as lack of consistency.
LoVetri JL, Weekly EM.[38] Contemporary commercial music (CCM) survey: Who's teaching what in nonclassical music. *J Voice*. 2003;17:207–215.	Contemporary commercial music deserves to be properly treated as a unique genre with specific demands and learning goals.
Elliot N, Sundberg J, Gramming P.[39] What happens during vocal warm-up? *J Voice*. 1995;9:37–44.	Vocal warm-up can help condition the voice, but effects vary considerably between subjects.
Verdolini K, Druker DG, Palmer PM, Samawi H.[41] Laryngeal adduction in resonant voice. *J Voice*. 1998;12:315–327.	Voice exercises focused on improving resonance promote the best laryngeal configuration, which is when the vocal folds are barely abducted or adducted.
Stemple JC, Lee L, D'Amico B, Pickup B.[44] Efficacy of vocal function exercises as a method of improving voice production. *J Voice*. 1994;8:271–278.	Simple exercises can improve vocal function within one month.
Fletcher HM, Drinnan MJ, Carding PN.[47] Voice care knowledge among clinicians and people with healthy voices or dysphonia. *J Voice*. 2007;21:80–91.	Voice care knowledge can be enhanced with the use of a simple questionnaire based on scientific data.
Gartner-Schmidt JL, Roth DF, Zullo TG, Rosen CA.[48] Quantifying component parts of indirect and direct voice therapy related to different voice disorders. *J Voice*. 2013;27:210–216.	Direct techniques occupy most of a therapy session and help different types of disorders while results obtained with indirect techniques are more variable.
Elliot N, Sundberg J, Gramming P.[49] Physiological aspects of a vocal exercise. *J Voice*. 1997;11:171–177.	The immediate effect of voice exercises can be studied in order to bring awareness to the patient.
Roubeau B, Henrich N, Castellengo M.[50] Laryngeal vibratory mechanisms: the notion of vocal register revisited. *J Voice*. 2009;23:425–438.	Voice production is different from perception and the controversial register terminology can be replaced by the concept of laryngeal mechanisms.
Burg I, Meier B, Nolte K, Oppermann T, Rogg V, Beushausen U.[51] Selection of Voice Therapy Methods. Results of an Online Survey. *J Voice*. 2015;29:776.e1-776.e6.	Cultural preferences influence the type of vocal exercises that are selected for therapy. The scientific evaluation of single methods does not correspond to practical experience, and therefore, an overall evaluation of voice therapy appears to be more real and useful.
Roy N, Bless DM, Heisey D, Ford CN.[52] Manual circumlaryngeal therapy for functional dysphonia: An evaluation of short-and long-term treatment outcomes. *J Voice*. 1997;11:321–331.	Laryngeal muscle tension reduction is a short-term therapy with stable results.
Mathieson L, Hirani SP, Epstein R, Baken RJ, Wood G, Rubin JS.[53] Laryngeal manual therapy: a preliminary study to examine its treatment effects in the management of muscle tension dysphonia. *J Voice*. 2009;23:353–366.	Muscle tension dysphonia can be measured with a discomfort scale, and effects of laryngeal manipulation are evident in the acoustical analysis.
Rattenbury HJ, Carding PN, Finn P.[54] Evaluating the effectiveness and efficiency of voice therapy using transnasal flexible laryngoscopy: a randomized controlled trial. *J Voice*. 2004;18: 522–533.	Visual feedback using nasal endoscopy can improve voice rehabilitation results.
Yiu E, Xu JJ, Murry T, Wei WI, Yu M, Ma E, Huang W, Yee-Lan Kwong E.[55] A randomized treatment-placebo study of the effectiveness of acupuncture for benign vocal pathologies. *J Voice*. 2006;20:144–156.	There is a role for alternative medicine approaches, such as acupuncture, in the treatment of benign lesions due to phonotraumatic events.
Pontes P, Behlau M.[56] Treatment of sulcus vocalis: auditory perceptual and acoustical analysis of the slicing mucosa surgical technique. *J Voice*. 1993;7:365–376.	An aggressive surgery followed by intensive rehabilitation can offer a better voice to severe cases of sulcus vocalis with intense vocal deviation.
Smith ME, Ramig LO, Dromey C, Perez KS, Samandari R.[57] Intensive voice treatment in Parkinson disease: laryngostroboscopic findings. *J Voice*. 1995;9:453–459.	Intensive voice treatment can produce measurable positive effects in progressive diseases such as Parkinson.
Patel RR, Bless DM, Thibeault SL.[58] Boot camp: A novel intensive approach to voice therapy. *J Voice*. 2011;25:562–569.	Intensive voice regimen with several sessions a day and many therapists can be a good option for recalcitrant dysphonia.

(*Continued*)

APPENDIX 4: (*Continued*)

REFERENCES	IMPORTANT LESSONS
Branski RC, Verdolini K, Sandulache V, Rosen CA, Hebda PA.[60] Vocal fold wound healing: a review for clinicians. *J Voice*. 2006;20:432–442.	Vocal folds wound healing is complex and low-impact stress exercises may help tissue mechanics.
Verdolini-Abbott K, Li NYK, Branski RC, Rosen CA, Grillo E, Steinhauer K, Hebda PA.[61] Vocal exercise may attenuate acute vocal fold inflammation. *J Voice*. 2012;26:814.e1-814.e13.	Selected vocal exercises may produce positive tissue mobilization to attenuate acute vocal folds inflammation.
Ishikawa K, Thibeault S.[62] Voice rest versus exercise: a review of the literature. *J Voice*. 2010;24:379–387.	Controlled vocal exercises can be preferable to long-term vocal rest after vocal fold surgery.
Law T, Lee KY-S, Ho, FN-Y, Vlantis AC, van Hasselt AC, Tong MC-F.[63] The effectiveness of group voice therapy: a group climate perspective. *J Voice*. 2012;26:e41-e48.	Group therapy is effective and group climate influences the outcome results.
De Bodt M, Patteeuw T, Versele A.[64] Temporal variables in voice therapy. *J Voice*. 2015;29:611–617.	There is an international pattern for voice therapy regarding duration and number of sessions: nine weeks and ten sessions. Substantial geographic differences are observed for North American and European patients.

APPENDIX 5: ARTICLES ON BEHAVIORAL *VERSUS* ORGANIC VOICE DISORDERS

REFERENCES	IMPORTANT LESSONS
Anderson L, Baylor CR, Eadie TL, Yorkston KM.[65] Describing Speech Usage in Daily Activities in Typical Adults. *J Voice*. 2016;30:42–52.	Levels of speech uses, from undemanding to extraordinary, can be used as a reference for the individual amount of communication.
Cornut G, Bouchayer M.[66] Phonosurgery for singers. *J Voice*. 1989;3:269–276.	Singers do not always have problems related to the singing technique and other options need to be considered.
Dejonckere PH, Lebacq J.[67] Plasticity of voice quality: a prognostic factor for outcome of voice therapy? *J Voice*. 2001;15:251–256.	Plasticity of voice seems helpful for indication of voice therapy, although its predictive value remains limited.
Andrews ML, Schmidt CP.[68] Congruence in personality between clinician and client: relationship to ratings of voice treatment. *J Voice*. 1995;9:261–269.	Personality characteristics of both clinician and patient are important factors of interaction in vocal therapy.
Guss J, Sadoughi B, Benson B, Sulica L.[69] Dysphonia in performers: toward a clinical definition of laryngology of the performing voice. *J Voice*. 2014;28:349–355.	Laryngology of the performing voice requires more than medical background.

REFERENCES

1. Behlau M, Pontes P. Avaliação e tratamento das disfonias. In: */Evaluation and treatment of dysphonias/*. São Paulo: Lovise; 1995.
2. Titze IR. Rationale and structure of a curriculum in vocology. *J Voice*. 1992;6:1–9.
3. Sonninen A, Hurme P. On the terminology of voice research. *J Voice*. 1992;6:188–193.
4. Casper JK, Brewer DW, Colton RH. Variations in normal human laryngeal anatomy and physiology as viewed fiberscopically. *J Voice*. 1987;1:180–185.
5. Linville SE. The sound of senescence. *J Voice*. 1996;10:190–200.
6. Fex S. Perceptual evaluation. *J Voice*. 1992;6:155–158.
7. Kempster GB, Gerratt BR, Verdolini-Abbott K, et al. Consensus auditory-perceptual evaluation of voice: development of a standardized clinical protocol. *Am J Speech Lang Pathol*. 2009;18:124–132.
8. Simberg S, Laine A, Sala E, et al. Prevalence of voice disorders among future teachers. *J Voice*. 2000;14:231–235.
9. Yamasaki R, Madazio G, Leão S, et al. Auditory-perceptual evaluation of normal and dysphonic voices using the voice deviation scale. *J Voice*. 2016;31:67–71.
10. Solomon NP, Helou LB, Stojadinovic A. Clinical versus laboratory ratings of voice using the CAPE-V. *J Voice*. 2011;25:e7–e14.
11. Sundberg J. What's so special about singers? *J Voice*. 1990;4:107–119.
12. Roy N, Ryker KS, Bless DM. Vocal violence in actors: an investigation into its acoustic consequences and the effects of hygienic laryngeal release training. *J Voice*. 2000;14:215–230.
13. Rantala L, Vilkman E, Bloigu R. Voice changes during work: subjective complaints and objective measurements for female primary and secondary schoolteachers. *J Voice*. 2002;16:344–355.
14. Behrman A. Common practices of voice therapists in the evaluation of patients. *J Voice*. 2005;19:454–469.
15. Karnell MP, Melton SD, Childes JM, et al. Reliability of clinician-based (GRBAS and CAPE-V) and patient-based (V-RQOL and IPVI) documentation of voice disorders. *J Voice*. 2007;21:576–590.
16. Sataloff RT, Spiegel JR, Carroll LM, et al. The clinical voice laboratory: Practical design and clinical application. *J Voice*. 1990;4:264–279.
17. Hirano M. Behavior of laryngeal muscles of the late William Vennard. *J Voice*. 1988;2:291–300.
18. Abitbol J, Abitbol P, Abitbol B. Sex hormones and the female voice. *J Voice*. 1999;13:424–446.
19. Behlau M, Zambon F, Moreti F, et al. Voice self-assessment protocols: different trends among organic and behavioral dysphonias. *J Voice*. 2017;31:112 e13-112.e27.
20. Hogikyan ND, Sethuraman G. Validation of an instrument to measure voice-related quality of life (V-RQOL). *J Voice*. 1999;13:557–569.
21. Branski RC, Cukier-Blaj S, Pusic A, et al. Measuring quality of life in dysphonic patients: a systematic review of content development in patient-reported outcomes measures. *J Voice*. 2010;24:193–198.
22. Welham NV, Maclagan MA. Vocal fatigue: current knowledge and future directions. *J Voice*. 2003;17:21–30.

23. Nanjundeswaran C, Jacobson BH, Gartner-Schmidt J, et al. Vocal Fatigue Index (VFI): development and validation. *J Voice*. 2015;29:433–440.
24. Prochaska J, DiClemente C. Stages and processes of self-change in smoking: toward an integrative model of change. *J Consult Clin Psychol*. 1983;5:390–395.
25. Van Leer E, Hapner ER, Connor NP. Transtheoretical model of health behavior change applied to voice therapy. *J Voice*. 2008;22:688–698.
26. Prochaska J, Velicer W. Introduction: the transtheoretical model. *Amer J Health Promot*. 1997;12:6–7.
27. Teixeira LC, Rodrigues AL, Silva AF, et al. The use of the URICA-VOICE questionnaire to identify the stages of adherence to voice treatment. *Codas*. 2013;25:8–15 Article in English, Portuguese.
28. Hugh-Munier CMC, Scherer KR, Lehmann W, et al. Coping strategies, personality, and voice quality in patients with vocal fold nodules and polyps. *J Voice*. 1997;11:452–461.
29. Oliveira G, Hirani SP, Epstein R, et al. Coping strategies in voice disorders of a Brazilian population. *J Voice*. 2012;26:205–213.
30. Boone DR. *The Voice and Voice Therapy*. Englewood Cliffs, NJ: Prentice-Hall Inc.; 1971.
31. Aronson AE. *Clinical Voice Disorders*. 3rd ed. New York: Thieme Stratton; 1990.
32. Colton RH, Casper JK. *Understanding Voice Problems: A Physiological Perspective for Diagnosis and Treatment*. Baltimore, MD: Williams and Wilkins; 1996.
33. Vinney LA, Turkstra LS. The role of self-regulation in voice therapy. *J Voice*. 2013;27:390 e1-390.e11.
34. Misono S, Meredith L, Peterson CB, et al. New perspective on psychosocial distress in patients with dysphonia: the moderating role of perceived control. *J Voice*. 2016;30:172–176.
35. Almeida AA, Behlau M. Relations between self-regulation behavior and vocal symptoms. *J Voice*. 2017;31:455–461.
36. Hapner E, Portone-Maira C, Johns MM. A study of voice therapy dropout. *J Voice*. 2009;23:337–340.
37. Boone DR. Expanding perspectives in care of the speaking voice. *J Voice*. 1991;5:168–172.
38. Lovetri JL, Weekly EM. Contemporary commercial music (CCM) survey: who's teaching what in nonclassical music. *J Voice*. 2003;17:207–215.
39. Elliot N, Sundberg J, Gramming P. What happens during vocal warm-up? *J Voice*. 1995;9:37–44.
40. Behlau M, Murry T. International and intercultural aspects of voice and voice disorders. In: Battle D, ed. *Communication Disorders in multicultural and international populations*. 4th ed. 2012:174–207.
41. Verdolini K, Druker DG, Palmer PM, et al. Laryngeal adduction in resonant voice. *J Voice*. 1998;12:315–327.
42. Stemple JC. Voice research: so what? A clearer view of voice production, 25 years of progress; the speaking voice. *J Voice*. 1993;7:293–300.
43. Speyer R. Effects of voice therapy: a systematic review. *J Voice*. 2008;22:565–580.
44. Stemple JC, Lee L, D'Amico B, et al. Efficacy of vocal function exercises as a method of improving voice production. *J Voice*. 1994;8:271–278.
45. Teixeira LC, Behlau M. Comparison between vocal function exercises and voice amplification. *J Voice*. 2015;29:718–726.
46. Pedrosa V, Pontes A, Pontes P, et al. The effectiveness of the comprehensive voice rehabilitation program compared with the vocal function exercises method in behavioral dysphonia: a randomized clinical Trial. *J Voice*. 2016;30:377 e11−377.e19.
47. Fletcher HM, Drinnan MJ, Carding PN. Voice care knowledge among clinicians and people with healthy voices or dysphonia. *J Voice*. 2007;21:80–91.
48. Gartner-Schmidt JL, Roth DF, Zullo TG, et al. Quantifying component parts of indirect and direct voice therapy related to different voice disorders. *J Voice*. 2013;27:210–216.
49. Elliot N, Sundberg J, Gramming P. Physiological aspects of a vocal exercise. *J Voice*. 1997;11:171–177.
50. Roubeau B, Henrich N, Castellengo M. Laryngeal vibratory mechanisms: the notion of vocal register revisited. *J Voice*. 2009;23:425–438.
51. Burg I, Meier B, Nolte K, et al. Selection of voice therapy methods. Results of an online survey. *J Voice*. 2015;29:776 e1-776.e6.
52. Roy N, Bless DM, Heisey D, et al. Manual circumlaryngeal therapy for functional dysphonia: An evaluation of short-and long-term treatment outcomes. *J Voice*. 1997;11:321–331.
53. Mathieson L, Hirani SP, Epstein R, et al. Laryngeal manual therapy: a preliminary study to examine its treatment effects in the management of muscle tension dysphonia. *J Voice*. 2009;23:353–366.
54. Rattenbury HJ, Carding PN, Finn P. Evaluating the effectiveness and efficiency of voice therapy using transnasal flexible laryngoscopy: a randomized controlled trial. *J Voice*. 2004;18:522–533.
55. Yiu E, Xu JJ, Murry T, et al. A randomized treatment-placebo study of the effectiveness of acupuncture for benign vocal pathologies. *J Voice*. 2006;20:144–156.
56. Pontes P, Behlau M. Treatment of sulcus vocalis: auditory perceptual and acoustical analysis of the slicing mucosa surgical technique. *J Voice*. 1993;7:365–376.
57. Smith ME, Ramig LO, Dromey C, et al. Intensive voice treatment in Parkinson disease: laryngostroboscopic findings. *J Voice*. 1995;9:453–459.
58. Patel RR, Bless DM, Thibeault SL. Boot camp: A novel intensive approach to voice therapy. *J Voice*. 2011;25:562–569.
59. Behlau M, Madazio G, Pacheco C, et al. Intensive short-term voice therapy: the Brazilian experience. *ASHA Perspect Voice Voice Disord*. 2014;24:98–103.
60. Branski RC, Verdolini K, Sandulache V, et al. Vocal fold wound healing: a review for clinicians. *J Voice*. 2006;20:432–442.
61. Verdolini-Abbott K, Li NYK, Branski RC, et al. Vocal exercise may attenuate acute vocal fold inflammation. *J Voice*. 2012;26:814 e1-814.e13.
62. Ishikawa K, Thibeault S. Voice rest versus exercise: a review of the literature. *J Voice*. 2010;24:379–387.
63. Law T, Lee KY-S, Ho FN-Y, et al. The effectiveness of group voice therapy: a group climate perspective. *J Voice*. 2012;26:e41–e48.
64. De Bodt M, Patteeuw T, Versele A. Temporal variables in voice therapy. *J Voice*. 2015;29:611–617.
65. Anderson L, Baylor CR, Eadie TL, et al. Describing speech usage in daily activities in typical adults. *J Voice*. 2016;30:42–52.
66. Cornut G, Bouchayer M. Phonosurgery for singers. *J Voice*. 1989;3:269–276.
67. Dejonckere PH, Lebacq J. Plasticity of voice quality: a prognostic factor for outcome of voice therapy? *J Voice*. 2001;15:251–256.
68. Andrews ML, Schmidt CP. Congruence in personality between clinician and client: relationship to ratings of voice treatment. *J Voice*. 1995;9:261–269.
69. Guss J, Sadoughi B, Benson B, et al. Dysphonia in performers: toward a clinical definition of laryngology of the performing voice. *J Voice*. 2014;28:349–355.
70. Moore P. *Organic Voice Disorders*. New Jersey: Prentice Hall; 1971.