Voice Self-assessment Protocols: Different Trends Among Organic and Behavioral Dysphonias

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Summary: Objectives. This study aimed to correlate the results of five self-assessment instruments for patients with behavioral or organic dysphonia (OD), and to analyze their relationship with listeners' judgments of degree of voice severity and predominant type of voice deviation.

Study Design. This is a cross-sectional prospective study.

Methods. A total of 103 patients (77 with behavioral dysphonia, 26 with OD) completed the Brazilian validated versions of five instruments: Voice Handicap Index (VHI), Voice-Related Quality of Life, Vocal Performance Questionnaire, Voice Symptom Scale (VoiSS), and Vocal Tract Discomfort Scale. Voice samples were collected for auditory-perceptual analysis. Correlations were made among protocols, and between these instruments and the perceptual analysis.

Results. None of the instruments correctly identified 100% of the dysphonic individuals. The VoiSS identified 100 of the 103 subjects. Numerous correlations were found with variable strength. The strongest correlation was between frequency and severity scales of the Vocal Tract Discomfort Scale ($r = 0.946$) and the total score of the VHI and VoiSS ($r = 0.917$). Correlations between the instruments and the perceptual analysis achieved only moderate strength; the VHI, the Voice-Related Quality of Life, and the VoiSS showed the highest correlations with counting numbers task, particularly for OD. The predominant type of voice deviation did not influence the score of the protocols.

Conclusions. None of the self-assessment instruments is capable of identifying all cases of dysphonia. However, they are important in assessing the impact of voice problem on quality of life. Patient self-assessment and clinician perceptual evaluation share only moderate correlations, with higher strength for counting numbers task in comparison with sustained vowel.

Key Words: voice–dysphonia–protocols–quality of life–self-assessment.

INTRODUCTION

The World Health Organization defines health as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.[1] The concept was recently broadened to include quality of life aspects, defined as the individual's self-perception about his or her role in life.[2] Questionnaires are standard instruments that assess the effects of health issues on quality of life. They also assist in quantifying the subject's self-perception of the negative social, professional, and financial impact.[1]

Dysphonia is defined as difficulty or deviation of voice production, which, in the majority of cases, does not result in an imminent risk of death. Typically, its treatment is elective. Because dysphonia is multidimensional, the voice assessment must include the history of the present complaint, an otolaryngologic evaluation, and an auditory-perceptual and acoustic evaluation by a speech-language pathologist.[3,4] The term for dysphonia that stems from inappropriate voice usage is behavioral dysphonia (BD). This type of disorder is highly prevalent in voice professionals.[5] The term for dysphonia resulting from injuries to the muscles or nerves that control phonation is organic dysphonia (OD).

Recent studies have used self-evaluation questionnaires to quantify the perceived impact of a voice disorder and to show the importance of these tools in identifying factors leading to the voice problem.[6] These questionnaires have also been used to identify key patient-related issues and consequently to address treatment options.[7,8] Development and validation of self-assessment questionnaires have gained momentum and are now adopted around the world.[4,6,9–12]

Many self-assessment questionnaires are available. The most referenced are the Voice Handicap Index (VHI),[9] validated into Brazilian Portuguese[11]; the Vocal Performance Questionnaire (VPQ),[13] validated into Brazilian Portuguese[14]; and the Voice Related Quality of Life (V-RQOL),[10] validated into Brazilian Portuguese,[4] which is the most commonly used language in Brazil.[3] The Vocal Tract Discomfort Scale (VTD)[15,16] and the Voice Symptom Scale (VoiSS),[17] validated into Brazilian Portuguese,[18] aim to quantify voice symptoms reported by patients with dysphonia. All of the above self-assessment scales (Brazilian versions) have cutoff values[7,8] separating subjects with no self-perceived vocal problem (called healthy voice subjects) from those with likely deviated voices that would require a full assessment (individuals at voice risk).

Numerous studies have shown that patients with dysphonia may vary in terms of the amount of self-perceived voice problem, which negatively impacts their quality of life,[6] as well as in terms of functional limitations and physical and socio-emotional concerns.[4,11,14,18,19] Age and gender may influence the perceived impact of these conditions.[20] However, little is known about age and gender's correlation with the different proposed instruments.

The literature shows only few studies that use more than one questionnaire within the same population for the sole purpose

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of investigating possible correlations among them. The majority of researchers have used the VHI,[9] the VHI-10,[21] and the V-RQOL,[10] either for a general dysphonic population,[22,23] for a specific pathologic population such as patients with cancer,[24,25] or for measurement of treatment effect.[26] High correlations have been reported between the VHI and the V-RQOL,[22–26] providing clinicians with a choice as to which questionnaire to use; however, in most cases, there is no clear process to guide this decision.[27] Although the content and psychometric properties of each test vary, the general findings of each of the above tests support their use in clinical settings related to voice disorders.[28–30]

Currently, only few studies have analyzed the relatedness of the aforementioned questionnaires. Little is known on how a dysphonia-specific group may perform on these different self-assessment tools. Also, little is known on the relationship between quality of life (the focus of the V-RQOL) and voice severity based on perceptual voice judgments, and between quality of life (V-RQOL) and patient handicap (VHI) due to their voice disorder. It also remains unknown whether the degree of voice deviation clinically determined by perceptual analysis corresponds to the degree of perceived loss on aspects of vocal performance (VPQ), voice symptom (VoiSS), or vocal tract discomfort (VTD). Lastly, it is also unknown whether the predominant type of voice deviation, ie, predominance of roughness, breathiness, or strain, is correlated with the impact perceived by the patient.

Therefore, the purposes of the current study are:

(1) To investigate the performance of subjects diagnosed with dysphonia on the following self-assessment protocols: VHI, V-RQOL, VPQ, VoiSS, and VTD, considering total scores and subscales, whereas existent.
(2) To compare all protocol scores of subjects with BD with all scores of subjects with OD.
(3) To compare self-assessment questionnaire scores with the degree of voice severity determined by perceptual analysis.
(4) To determine whether the predominant type of voice deviation (roughness, breathiness, or strained voice) is related to the perceived loss in quality of life, voice handicap, reduced performance, or voice symptoms.

METHOD

This research was approved by the Ethics in Research Committee of the *Universidade Federal de São Paulo* (CEP # 0911/11). All participants signed an informed consent. One hundred and three subjects participated in the study (27 men and 76 women, mean age 39.25 years, SD = 14.68). Participants were categorized into two groups according to the etiology of their voice problem: BD or OD. The BD group had 77 subjects (58 women and 19 men; mean age 40.31 years, SD = 15.53) and the OD group had 26 subjects (18 women and 8 men; mean age 36.11 years, SD = 11.49). All subjects were consecutively seen individuals with clinically determined dysphonia, who sought help because of a voice complaint. They were patients from the authors' associated institutions, invited to participate voluntarily in the research. No patient refused to take part in the study. Data were collected in the years 2013 and 2014. Individuals underwent Speech-Language Pathology (SLP) and Otolaryngology (otorhinolaryngologists) assessments to obtain a diagnosis of dysphonia, to provide them with a referral, and to categorize them into the two aforementioned groups. The BD group included patients with voice problems predominantly related to voice usage, including poor voice technique, muscle tension, and vocal abuse/misuse. The OD group, with OD defined as a systemic disorder, included patients with neurologic disease or laryngeal lesion, with no behavioral component to their dysphonia such as vocal abuse/misuse. Patients with BD presented with the following findings in their otolaryngologic assessment: vocal fold edema, functional aphonia, vestibular phonation, minor structural alterations, glottic gap, benign mass lesions, or normal examination in the presence of voice deviations. It is important to emphasize that the categorization of BD was obtained by analyzing the history of the problem and the patients' vocal habits and techniques; moreover, the presence of an organic lesion did not exclude patients from this group if the lesion was a clear consequence of the use of voice. Patients with OD presented with the following diagnoses: laryngeal cancer, laryngeal neurofibromatosis, vocal fold paralysis, laryngeal dystonia, postsurgical vocal fold scar, chronic laryngitis, laryngeal amyloidosis, laryngeal stenosis, and/or vocal fold atrophy due to continuous use of inhaled cortisone. No cases of acute dysphonia were included.

Inclusion criteria were adults older than 18 years of age, voice complaint of any degree or type, and BD group and OD group dysphonia as diagnosed by SLP and otorhinolaryngologists assessments. Exclusion criteria were not being available or interested in the research; the presence of neurologic, cognitive, and/or psychiatric disorders compromising the ability to answer the questionnaires; and/or lack of comprehension of the questionnaires' instructions determined by inability to answer the questions.

Patients underwent the following procedures: voice recording for perceptual analysis and completing self-assessment questionnaires presented in random order.

The voice recording was performed in a silent room, using a por computer (Dell Latitude 3440, DELL, Brazil), with an external sound card Andrea PureAudio USB (Andrea Electronics Corporation, USA) and headset Karsect Ht2 (Karsect, Brazil), placed at 45° and 2 cm from the patient's mouth. Sample rate was 44.1 KHz and the software used was *Fonoview* (version 4.5h, CTS *Informática*, Brazil). The subjects performed two tasks: sustaining the vowel /Ɛ/ and counting numbers from 1 to 10, in a comfortable pitch and loudness self-selected by the patient. Subjects were asked to sustain the vowel for as long as possible, after taking a deep breath; for the counting numbers task, patients were asked to maintain their regular speech rate. Both tasks were performed once, unless the patient made a mistake in counting, or accidently stopped vowel production because of coughing or any other atypical event. Audio samples were analyzed by a voice-specialized SLP with at least 20 years of clinical and research experience. Intra-judge reliability was high (random repetition index of 20% of all voice samples: alpha Cronbach coefficient 0.910, $P < 0.001$ for the sustained vowel production; 0.950, $P < 0.001$ for the counting numbers task, and 0.865, $P < 0.001$ for the predominant type of voice deviation).

The degree of auditory perceptual voice deviation was scored using a four-point numeric scale: 0 = absence of deviation,