

Predictors of Six-month Change in the Voice Handicap Index in a Treatment-seeking Population

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Summary: Objective. To evaluate predictors of longitudinal change in patient-perceived voice impact as determined by the Voice Handicap Index (VHI).

Study Design. Prospective, survey study.

Methods. Patients consented to the University of Wisconsin Voice and Swallow Clinics Outcomes Database with voice, concerns with a baseline clinic visit from November 2012 to January 2014 were eligible for the study. The VHI was sent to patients 6 months post clinic visit to determine change in voice handicap from baseline. General health was screened using the 12-item Short Form Health Survey, using physical component summary and mental component summary scores. Predictor variables included treatment (medical and/or behavioral); dysphonia sub-diagnosis; grade, roughness, breathiness, asthenia, and strain rating; age; sex; socioeconomic factors; smoking history; and comorbidity score.

Results. Two hundred thirty-seven patients met study criteria and were followed longitudinally. Eighty-two patients returned 6-month surveys. The VHI was significantly correlated with mental component summary scores. Patients with a higher grade in baseline grade, roughness, breathiness, asthenia, and strain score were more likely to receive voice intervention ($P = 0.04$). Six-month improvement in VHI score was associated with both higher initial VHI score and higher educational level in both univariate ($P < 0.01$, $P = 0.04$) and multivariate analyses ($P < 0.01$, $P = 0.02$). Voice treatment (medical and/or behavioral) was not a significant factor for improvement in VHI score.

Conclusions. Our results suggest that it is important to consider baseline self-perceived voice impact measures and educational level in setting expectations for voice treatment. Future studies examining the relationship between treatment patterns and voice-related patient outcomes are warranted.

Key Words: Voice—Voice disorders—Voice Handicap Index—Patient-centered outcomes—Long-term outcomes.

INTRODUCTION

Disorders of the voice and diseases of the larynx are a growing public health concern. Although typically benign and not considered to be life threatening, they often affect communication abilities in both social and occupational contexts and can adversely affect quality of life. Recent reports show that these disorders have direct healthcare costs in the United States approaching \$4.9 billion annually, including evaluation and treatment costs.¹ An estimated 7% of the workforce miss a day or more of work each year with nearly 50% of treatment-seeking patients reporting voice problems affecting their current work abilities.^{2,3} Dysphonia, or disordered voice, has a reported lifetime prevalence of nearly 30%,³ indicating a significant public health impact.

In the current healthcare climate, there is a growing emphasis on patient-centered care and outcomes.^{4,5} The patient's own subjective concerns play an important role in the complex clin-

ical evaluation as well as in guiding the basis for a treatment plan. The Voice Handicap Index (VHI) is a validated assessment tool that captures the severity of the voice problem from the patient's perspective, including functional, physical, and emotional domains.⁶ It is widely used in clinical evaluations of dysphonia, which also includes clinician-rated measures of perception such as the overall dysphonia grade, roughness, breathiness, asthenia, and strain (GRBAS) or Consensus Auditory Perceptual Evaluation of Voice scales, patient medical history, videostroboscopy ratings, and objective acoustic and aerodynamic measures. However, the VHI is weakly correlated to other clinical voice evaluation measures, such as jitter %, shimmer %, signal-to-noise ratio, maximum phonation time, dysphonia severity index, subglottic pressure, and mean flow,⁷⁻¹⁰ and patients have demonstrated wide variability in their VHI scores presenting with similar vocal pathology and objective measures.¹¹

The VHI and other patient-reported voice scales like the Voice-Related Quality of Life questionnaire,¹²⁻²⁰ Voice Symptom Scale,^{14,21,22} and Vocal Performance Questionnaire²³⁻²⁶ are commonly used in dysphonia outcomes research. However, factors driving patient-perceived improvement in voice handicap are not well understood. Studies have examined the same clinical evaluation measures listed above to predict patient perception using the VHI, but these were completed once and were not prospectively followed.^{8,27} Other studies have focused on treatment efficacy longitudinally, but looked at one specific diagnosis such as laryngeal cancer, vocal fold paralysis, or spasmodic dysphonia.²⁸⁻³² One patient-centered outcomes study used voice-related quality of life measures (VHI, Vocal Performance

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Questionnaire, and Voice Symptom Scale) to examine responsiveness to change after voice therapy or phonosurgery. The said study demonstrated large effect sizes in overall improvement in voice-specific questionnaires post treatment; however, it did not consider patients diagnosed with a voice or other laryngeal disorder not seeking follow-up treatment.³³ Additionally, longitudinal analyses of individuals with functional voice disorders demonstrated a high rate of recurrences of dysphonia in 51% to 68% of patients following treatment, suggesting a lack of long-term improvements in these individuals.^{34,35} The primary goal of this study was to assess how patient-reported outcomes change as the result of additional treatment after evaluation (medical and/or behavioral). Additionally, we were interested in other patient characteristics that have not been explored previously to determine if these predict change in self-perceived voice handicap. To our knowledge, this is the first study to evaluate specific patient characteristics predictive of long-term change in patient-centered dysphonia measures. Understanding factors that drive change in patient-centered outcome measures, like the VHI, will help guide clinical care and optimize expectations when treating patients with voice disorders.

METHODS

Study population

Patients consented to the University of Wisconsin (UW) Voice and Swallow Clinics Outcomes Database from November 2012 to January 2014 were eligible for this study. Establishment and subsequent use of this database has been approved by the UW Madison School of Medicine and Public Health Institutional Review Board. Information in the database is obtained with patient consent for those who visit the otolaryngology head and neck clinic for a complaint related to voice or swallow and includes patient health information for over 4000 persons.

All patients in the UW Voice and Swallow Clinics Outcomes Database were initially evaluated by a speech-language pathologist (SLP) and otolaryngologist head and neck surgeon (ENT) because of concerns with voice, cough, and/or breathing. Only those patients with concerns regarding voice or vocal quality were included in this study. Baseline data were collected during the visit and from an intake form filled out by the patient including the primary outcome variable, the VHI. Patients also completed a general health questionnaire, a 12-item Short Form Health Survey (SF-12v2). Additional patient-level variables collected included an auditory-perceptual rating of dysphonia (GRBAS), dysphonia diagnosis (benign laryngeal disorders, chronic laryngitis, and neurological disorders), age, sex, smoking history, presence of comorbidities, treatment (medical and/or behavioral), and socioeconomic factors (educational attainment and mean income) collected from census-level data obtained from patient zip code. SF-12v2 and VHI surveys were sent to consented patients 6 months after his or her last visit to the clinic. For patients who received an evaluation only, surveys were sent 6 months after that encounter date. For patients who received additional treatment, surgical and/or behavioral, surveys were sent 6 months after the last voice intervention or follow-up evaluation encounter date.

VHI (primary outcome variable)

The VHI,⁶ a self-administered, validated questionnaire consists of 30 questions based on three different domains that measure functional, physical, and emotional aspects of the voice. Total scores range from 0 (no voice handicap) to 120 (maximum voice handicap), which were used in the current study. It measures the impact of voice problems in everyday life and has demonstrated sensitivity to change following therapy, medical, and surgical voice management.³³

SF-12v2

The SF-12v2 Health Survey,³⁶ a self-administered, validated questionnaire is a global measure of health. It uses 12 questions to measure functional health and well-being. The SF-12 series cover all eight health domains from the SF-36 using a subset of the same questions; therefore, results can be compared and the survey can be completed in 2 minutes or less.³⁷ The SF-12v2 contains changes to the original SF-12, which includes improvements in layout, instructions, and word simplification, modeling previous improvements made to the SF-36v2 from the original survey.³⁸ The SF-12v2 was collected to determine whether there was a correlation between changes in physical and/or mental health measures and changes within the VHI. Scores are reported as a physical component summary (PCS) score and a mental component summary (MCS) score derived from the survey questions. This survey was normalized on a subset of people within the United States, and the average score is 50 for each scale, with a range from 0 (worst) to 100 (best).

Patient-level variables

Patient-level variables retrieved from the UW Voice and Swallow Clinics Outcomes Database included age, sex, smoking history, comorbidities, and level of treatment. Age, sex, and smoking history (yes, current or past, or no) are collected *via* a patient intake form. The Charlson Comorbidity Index quantified patient comorbidity using a program based on the original Charlson Comorbidity Index calculator. The index was originally created based on 1-year mortality data from 19 medical conditions with a weight of 1 (eg, myocardial infarct) to 6 (malignant tumor), with scores ranging from 0 to 37. Patient age is also factored into the overall score.^{39,40} Socioeconomic factors were collected *via* the US Census Bureau's American Community Survey (ACS), based on patient five-digit zip codes; these data were obtained from the ACS 2007–2011 5-year estimates.⁴¹ Five-year estimates were chosen based on availability of data for patients living in small communities or rural areas and higher reliability of data compared with ACS 1-year and 3-year estimates.⁴²

Other patient variables were determined at the initial voice evaluation by the SLP and ENT, including diagnosis, auditory-perceptual rating (GRBAS), and baseline VHI severity. Clinician-perceived perceptual rating was completed using the GRBAS scale. Overall grade was chosen for this analysis, with scores ranging from 0 (normal) to 3 (severe). VHI severity was divided into four groups: no to minimal impairment (0–17), mild impairment (18–39), moderate impairment (40–59), and severe impairment (60+), based on cutoff values within the database.

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