The Role of Occupational Voice Demand and Patient-Rated Impairment in Predicting Voice Therapy Adherence

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Summary: Objective. Examine the relationship among the severity of patient-perceived voice impairment, perceptual dysphonia severity, occupational voice demand, and voice therapy adherence. Identify clinical predictors of increased risk for therapy nonadherence.

Methods. A retrospective cohort study of patients presenting with a chief complaint of persistent dysphonia at an interdisciplinary voice center was done. The Voice Handicap Index-10 (VHI-10) and the Voice-Related Quality of Life (V-RQOL) survey scores, clinician rating of dysphonia severity using the Grade score from the Grade, Roughness Breathiness, Asthenia, and Strain scale, occupational voice demand, and patient demographics were tested for associations with therapy adherence, defined as completion of the treatment plan. Classification and Regression Tree (CART) analysis was performed to establish thresholds for nonadherence risk.

Results. Of 166 patients evaluated, 111 were recommended for voice therapy. The therapy nonadherence rate was 56%. Occupational voice demand category, VHI-10, and V-RQOL scores were the only factors significantly correlated with therapy adherence ($P < 0.0001$, $P = 0.018$, and $P = 0.008$, respectively). CART analysis found that patients with low or no occupational voice demand are significantly more likely to be nonadherent with therapy than those with high occupational voice demand ($P < 0.001$). Furthermore, a VHI-10 score of ≤29 or a V-RQOL score of >40 is a significant cutoff point for predicting therapy nonadherence ($P < 0.011$ and $P < 0.004$, respectively).

Conclusion. Occupational voice demand and patient perception of impairment are significantly and independently correlated with therapy adherence. A VHI-10 score of ≤9 or a V-RQOL score of >40 is a significant cutoff point for predicting nonadherence risk.

Key Words: Dysphonia–Voice handicap–Occupational voice–Therapy dropout–Adherence.

INTRODUCTION

Voice therapy, like all behavioral interventions, requires patient engagement and adherence to the treatment plan in order to reach the target outcome. As such, therapy adherence is critical to achieving voice improvement, even more so than the therapeutic technique or approach.[1] In addition to therapeutic outcomes, voice therapy nonadherence can have negative financial and productivity implications for the hospital, clinic, or practice.[2] Nonadherence to voice therapy has been defined in several ways: 1) failure to present to therapy, 2) failure to comply with exercises or recommendations, and 3) failure to complete the prescribed course of therapy. Depending on how it is defined, the rate of nonadherence to voice therapy has been reported to be between 38% and 74%[3–6], making it a clinical challenge that warrants investigation so that it can be effectively mitigated.

Patient-related factors such as medical diagnosis, medical comorbidities, race, gender, perceptual dysphonia, and patient perception of impairment have been previously examined, and no significant correlation to therapy adherence has been identified.[3–5] Interdisciplinary clinic models, treatment approach (ie, vocal hygiene versus vocal exercise) temporal variables (ie, number of therapy sessions and otolaryngologist referral to speech-language pathologist [SLP] evaluation latency), and socio-cognitive factors have all been found to significantly impact voice therapy adherence.[2,6–9] While these findings provide some clinically actionable steps for mitigating nonadherence, factors associated with treatment nonadherence merit additional investigation.

The objective of this study was to examine factors associated with voice therapy nonadherence. We hypothesized that patient perception of voice impairment and occupational voice demand would be predictive of therapy nonadherence. This was based on the premise that these two factors may be strong drivers of the socio-cognitive factors known to influence treatment adherence (eg, self-efficacy and motivation).[7,10,11] Furthermore, we aimed to quantify nonadherence risk and develop a decision-making model for determining nonadherence risk in the clinic setting.

MATERIALS AND METHODS

This retrospective cohort study included patients presenting to an interdisciplinary tertiary care center with a chief complaint

of dysphonia between January 2015 and August 2016. Patients who were at least 18 years of age and had complete medical records in an outpatient electronic health record (Epic 2014, Verona, Wisconsin) were included. All patients were evaluated by a fellowship-trained laryngologist and a certified SLP specializing in voice disorders. The following data were recorded: patient demographics, perceptual voice quality rating, patient perception of voice impairment, voice diagnosis, occupational voice demand, and adherence to voice therapy.

Adherence to voice therapy was defined as the completion of the treatment plan (ie, attendance of all recommended therapy sessions). The frequency and duration of therapy were variable and based on SLP evaluation, patient goals, and ongoing therapeutic reassessment. Given that adherence has been found to be influenced by the length of the treatment plan, we collected the visit count for each patient. This number included all attended sessions with the SLP, including the evaluation. Clinical documentation had to demonstrate goal attainment to the satisfaction of the clinician and/or patient as the reason for discharge in order to be marked as treatment adherent in this study. Examples of this documentation include the following: "Patient has met all therapy goals and is discharged from formal voice therapy" or "Patient is satisfied with current voice functioning, has met therapy goals, and is ready to be discharged from formal voice therapy." Direct voice therapy techniques (eg, resonant voice therapy) were the primary modality of treatment.

Perceptual voice quality was rated prospectively by the SLP at the time of the assessment using the Grade score from the Grade, Roughness, Breathiness, Asthenia, and Strain (GRBAS) scale.[12] The Grade score was chosen as a representative number in this study, as it encompasses the clinician's overall rating of the patient's perceptual dysphonia. It is a 4-point severity scale with 0 indicating no perceptual dysphonia, 1 indicating a mild dysphonia, 2 indicating moderate dysphonia, and 3 indicating a severe perceptual dysphonia. The patient's perceived voice impairment was also collected prospectively via patient completion of validated patient surveys: the Voice Handicap Index-10 (VHI-10) and the Voice-Related Quality of Life (V-RQOL) scale.[13,14] The VHI-10 score was tabulated as a raw sum score where 0 reflects no impairment and 40 reflects the highest degree of perceived impairment. In contrast, the V-RQOL raw scores were converted to a percent score with 100 reflecting no impairment and 0 reflecting maximal impairment. We selected these particular surveys as they are short and can be easily utilized in a busy clinic practice. We chose to use both surveys as they examine slightly different contexts of voice handicap versus quality of life. As a result, the authors have traditionally used both to address these related but slightly different issues as they pertain to individual patients.

Occupational voice demand was categorized as either high or low based on patient report of occupational duties. Examples of occupations categorized as high voice demand were singers, teachers, those working on the phone, or those working in sales. Examples of low-voice demand occupations were those who were retired or unemployed, skilled trade workers, and office workers. The mean VHI-10, V-RQOL, and Grade score from the GRBAS scale, as well as occupational voice demand, were compared between these two groups, along with demographic factors.

Continuous or quantitative variables were compared between groups using the Mann-Whitney or Kruskal-Wallis test, as appropriate, and categorical variables were compared using Fisher's exact test. Box plots were used to depict the distributional characteristics of VHI-10, V-RQOL, and Grade scores of adherent versus nonadherent patients. In order to identify variables associated with the incidence of nonadherence, univariate and multivariable analyses were performed by constructing decision trees using the Classification and Regression Tree (CART) methodology. A decision tree is a logical model represented as a binary tree that shows how the value of a response variable (adherence or nonadherence) can be predicted by using the values of a set of predictor variables (VHI-10, V-RQOL, and occupational voice demand). A classification tree is generated that predicts the probability that a subject will be nonadherent. The unified CART framework that embeds recursive binary partitioning into the theory of permutation tests was used in this analysis.[15] This approach results in unbiased selection among variables measured at different scales (such as categorical, ordinal, or continuous). Significance testing procedures are applied to determine whether no significant association between any of the variables and the response can be stated and the recursion needs to stop. The open-source R package *party* (www.r-project.org) was used in the computations.[16] All tests were two-sided and used a type I error of 5% to determine statistical significance. Institutional Review Board approval from the Fox Chase Cancer Center, Temple University Health System, was obtained for this study.

RESULTS

Of all patients seen in the interdisciplinary voice clinic, 166 met inclusion and exclusion criteria. Of these patients, 111 were recommended to participate in voice therapy with a SLP as part of their treatment plan. Of those recommended to participate in therapy, 35 were male and 76 were female. The mean age of all patients was 59 years. The number of sessions attended ranged from 0 to 10 for the entire sample, with a mean of 4, a mode of 3, and a median of 1.

Patients were broadly classified into two categories: adherent to voice therapy or nonadherent to voice therapy, as defined above. Forty-nine patients (44%) were in the adherent group, with a mean session attendance of 5 (range 2–10). Sixty-two patients (56%) were in the nonadherent group, with a mean session attendance of 2 (range 0–8). The mean VHI-10 score in the therapy adherent group was 19.9, and this was found to be significantly higher than the mean VHI-10 score in the therapy nonadherent group, which had a mean VHI-10 of 15.7 ($P = 0.018$) (Figure 1a), suggesting that nonadherent patients perceived less baseline voice impairment. When looking at V-RQOL data, the mean score in the adherent group was 59.5, which was significantly lower than the nonadherent group's mean score of 72.88 ($P = 0.008$) (Figure 1b), again suggesting lower patient-perceived voice impairment in the nonadherent group.

Occupational voice was also associated with therapy adherence. Those patients with an occupation associated with higher voice demands were more likely to adhere to voice therapy; in contrast, patients without significant occupational voice demand