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Dysphonia in nursing home and assisted living residents: prevalence and association with frailty

Brent Nichols, MD,

Department of Otolaryngology and Communication Sciences, Medical College of Wisconsin, Milwaukee, Wisconsin

Varun Varadarajan, MD,

Medical College of Wisconsin, Milwaukee, Wisconsin

Jonathan M. Bock, MD, and

Department of Otolaryngology and Communication Sciences, Medical College of Wisconsin, Milwaukee, Wisconsin

Joel H. Blumin, MD*

Department of Otolaryngology and Communication Sciences, Medical College of Wisconsin, Milwaukee, Wisconsin

Abstract

Objective—Previous studies of geriatric dysphonia prevalence have been limited to ambulatory outpatient and senior communities. Our goal was to identify prevalence of dysphonia in nursing home residents and assisted living residents and search for correlations between indices of dysphonia and indices of frailty.

Study Design—Prospective epidemiological survey.

Methods—Residents of a vertically integrated senior care organization who were 65 or older and able to understand and complete the questionnaire were recruited to complete the Voice Handicap Index 10 (VHI-10) to assess for dysphonia (VHI-10 > 10 = dysphonia) and Vulnerable Elders Survey 13 (VES-13), a validated instrument to assess for frailty (VES >3 = frailty).

Results—A total of 119 residents were surveyed. Thirty-three percent of nursing home residents, and 25% of assisted living residents reported dysphonia with 29% of all respondents reporting dysphonia. The mean VHI-10 was 7.4, the median was 5, and the interquartile range was 2 – 12.5. There was a significant relationship between VHI-10 and VES-13 score ($p = 0.029$). There were

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*Corresponding Author – jblumin@mcw.edu (email); 414.805.5689; (phone) - 414.805.7890 (fax).

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no statistically significant relationships between frailty, age, or type of living and dysphonia or VHI-10.

Conclusion—There is a high prevalence of voice dysfunction in assisted living and nursing home residents. The correlation between VHI-10 and VES-13 suggests that voice declines as frailty increases.

Keywords

Dysphonia; Geriatrics; Geriatric voice; Geriatric dysphonia; Frailty; Prevalence Dysphonia

Introduction

Individuals over the age of 65 represent one of the fastest growing demographics in the United States, and they are expected to represent 30% of the population by 2030.^{1,2} Thus, it is becoming increasingly important to understand health problems faced by this population.³ Vocal health and voice disorders have important implications for quality of life in the geriatric population.^{4,5}

The causes of geriatric voice dysfunction include changes in laryngeal anatomy, neurologic function, and pulmonary function. Geriatric voice disorders occur within the context of global changes in physiologic reserve and well-being. Previously identified factors that increase risk of dysphonia in geriatric patients include esophageal reflux, severe neck pain, and chronic pain.^{1,6} Frailty is a biologic syndrome of decreased reserve resulting from cumulative declines across multiple physiologic systems making one more vulnerable to adverse outcomes.^{7,8} As such, it is a distinct collection of characteristics often not captured by diagnosis of disability or a conglomeration of medical diagnoses.⁹ The role of frailty on otolaryngologic disorders, including dysphonia, has not been previously reported. Studying the role of frailty in otolaryngologic disease processes requires research tools that can be efficiently used to identify frailty.

We have observed anecdotally that some patients develop dysphonia in conjunction with overall physiological decline and aging. Frailty is associated with physiological decline and aging, and as such, we hypothesized that there may be a relationship between dysphonia and overall frailty as well.⁷ This relationship has not been previously studied. Establishing a link between frailty and dysphonia would have implications both for those treating voice disorders in elderly patients and for primary care providers managing the general health of such patients. For example, if patients with voice complaints are more likely to be frail, additional health screening may be indicated in these patients.

The reported point prevalence of geriatric voice disorders in recent literature ranges from 20–29%.^{10,11} This variability is likely due to differences in the geriatric subpopulation assessed, definitions of dysphonia, and methodologies used to identify dysphonia. Understanding the prevalence of dysphonia in large segments of the geriatric population is important to improve identification and interventions in this population. Previous studies reporting geriatric incidence of dysphonia have surveyed ambulatory outpatients and senior community residents as a proxy for all geriatric individuals, which excludes an important

subset of individuals, residents in assisted living and nursing facilities.^{10,11} We hypothesized that frailty is positively correlated with dysphonia in geriatric populations. Additional aims of our study were to identify the prevalence of dysphonia in two previously unstudied groups, assisted living residents and nursing home residents and to evaluate the utility of the Vulnerable Elders Survey-13 (VES-13) to otolaryngology research protocols.

Materials and Methods

We performed a prospective survey of two geriatric populations. All subjects were residents of a vertically integrated senior care organization with an assisted living and nursing home facility in Wisconsin. The Medical College of Wisconsin Institutional Review Board approved the study protocol. Recruitment for the study took place at the facility and was voluntary. Inclusion criteria were age 65 or greater and ability to understand and answer the questions in the survey. Exclusion criteria included diagnosis of dementia or inability to complete the survey. Enrolled subjects had the option to complete the survey in writing or orally, this was done in order to include participants with physical deficits that would have otherwise limited their ability to participate. The first survey administered was the Voice Handicap Index 10 (VHI-10). The VHI-10 is a concise tool that captures and quantifies a patient's global state of voice handicap and has been used to assess patients with a wide range of voice disorders.¹² It also has the advantage of having established normal and abnormal values with VHI-10 score of greater than 10 consistent with dysphonia.¹²

Subjects then completed the Vulnerable Elders Survey 13 (VES-13). The VES-13 is a validated tool for measuring frailty that has direct correlations with risk of falls, dementia, physical decline, and death when analyzed over a 5-year period.⁸ The VES-13 score ranges from 0–10 and frailty is defined as VES-13 score >3. Descriptive statistics were calculated and bivariate analyses of association were performed. VHI-10 and VES-13 data were not normally distributed and a regular t-test was not applicable. As such, Kruskal-Wallis rank sum and Fisher Exact tests were used to assess the significance of associations between frailty, type of residence (assisted living vs. nursing home), dysphonia, and VHI-10. As the VHI-10 and VES-13 were not normally distributed, we choose to report medians and interquartile ranges for these variables.

Results

A total of 286 residents live at the facility and eighty-five residents were excluded due to dementia. Of the 201 residents who met inclusion criteria, 119 completed the survey. Sixteen were between 65 and 75 years in age, 35 were between 75 and 85 in age, and 68 were older than 85. Fifty two of the respondents were assisted living residents and 67 were nursing home residents. Frailty was present in 76% of respondents, with 61% of assisted living and 90% of nursing home residents reporting frailty. Thirty-three percent of nursing home residents and 25% of assisted living residents reported dysphonia with 29% of all respondents reporting dysphonia. The mean VHI was 7.4, the median was 5, and the interquartile range was 2 – 12.5. Regression analysis identified a significant relationship between VHI-10 and VES-13 score with a P-value of 0.029 and a linear correlation of 0.201.

Subjects with dysphonia were compared with those without dysphonia. There were no significant differences identified between the groups. The median VES score was 8 in those with dysphonia, and 6.5 in those without dysphonia (Table 1). Frail subjects were compared with non-frail, the median VHI was 6 and 4 respectively, however, no significant differences were identified (Table 2). Subjects were analyzed based on type of living facility (assisted living and nursing home). There was a 25% prevalence of dysphonia in assisted living residents and 33% prevalence in nursing home residents which was not significantly different. There was a strong correlation between frailty and type of living facility with frail individuals more likely to live in a nursing home facility ($p < 0.001$) (Table 3). Subjects were grouped by age greater or less than 85. Fifty seven percent of respondents were 85 or older. The prevalence of dysphonia and median VHI were higher in the cohort of patients older than 85 (31% and 6.5) when compared to those younger than 85 (27% and 4) respectively. These differences were not statistically significant (Table 4).

Discussion

Vocal health and voice disorders have important implications for quality of life in the geriatric population.³ We are the first to use a validated frailty assessment instrument (VES-13) to study the relationship between frailty and voice disorders in the elderly, identifying a correlation between VES-13 and VHI-10. We are also the first to report on the prevalence of dysphonia in assisted living and nursing home residents (25.2% and 33.8% respectively). The identified prevalence of dysphonia is consistent with the 20–29 % reported in other geriatric populations.^{2,13} This is markedly higher than the 6–7.5 % rate of dysphonia in the general population.¹⁴ Using the VHI-10 to measure dysphonia provides a definition that corresponds to the practical implications of voice disorders on health.¹² By reporting self-identified voice indicators, we have demonstrated a high prevalence of self-perceived voice handicap in geriatric patients in assisted living and nursing home environments. Frail patients identify their voice as having a significant impact on quality of life even in the presence of their other medical conditions and functional limitations.

Previous research in geriatric voice disorders found conflicting results in the association between dysphonia and medical co-morbidities in geriatric patients. We identified a significant positive correlation between VHI-10 and VES-13 scores suggesting a relationship between generalized biological decline and voice dysfunction. This demonstrates that as functional status and frailty decrease, patients experience more voice complaints. Although the correlation between VHI-10 and VES-13 is statistically significant, it is unclear if it is a strong enough correlation to have clinical utility (e.g. influence screening patterns for dysphonia or frailty). The identified correlation in VHI-10 and VES-13 scores did not persist when these continuous variables were converted to the binomial variables of frailty (VES-13 > 3) and dysphonia (VHI > 10). We had anticipated there would be a robust relationship between frailty and dysphonia, and we would find a significant relationship between these variables; however, this was not the case.

When comparisons were made between the variables of frailty, age (> 85 and ≤ 85), or living facility and prevalence of dysphonia or VHI-10 no significant associations were identified. There were weak trends towards a positive relationship between VHI-10 and age

and type of living facility. It is possible that these associations exist, however, due to our moderate sample size (n=119) we may have been underpowered to identify such relationships.

The VES-13 is an established research tool which has been used to predict 5 year all-cause mortality and functional decline, and has also been applied to specific clinical problems such as responsiveness to diabetes treatment regimens.^{7,8,15} We identified a high prevalence of frailty in both assisted living and nursing home residents, with greater than 90% of nursing home residents meeting criteria for frailty. The VES-13 is a fairly brief and easy to administer questionnaire and we found it useful in the identification of frail patients. The VES-13 may also prove useful to those studying other otolaryngologic concerns in geriatric populations.

Our findings have important implications for voice care in the United States. Our research examined the prevalence of dysphonia rather than a specific diagnosis. Further research should identify the prevalence of specific causes of dysphonia in geriatric patients along with strategies to manage them in geriatric patients. This will require a collaborative effort by speech therapists, otolaryngologists, and primary care physicians.

Conclusion

There is a high prevalence of dysphonia in assisted living and nursing home residents. We have demonstrated the first application of the VES-13 to otolaryngologic research. VHI-10 is positively correlated with VES-13, suggesting a positive relationship between dysphonia and frailty. These findings should raise awareness among otolaryngologists, geriatricians, and primary care physicians regarding the prevalence and quality of life impact of dysphonia in their geriatric patients

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Research Institution: Medical College of Wisconsin, Milwaukee, Wisconsin

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Table 1
Comparison of Frailty (VES-13 > 3) and Non-frail subjects

Comparison of Dysphonic (VHI-10>10)and Non-dysphonic subjects.

	Dysphonia (VHI-10>10)	No Dysphonia (VHI- 10<=10)	P-value
VES Score (Median (Interquartile Range))	8(3.5–9)	6.5(4–9)	0.15
Frailty (Percentage VES-13 > 3)	0.74	0.76	0.81
Age (Percentage 85)	0.60	0.56	0.83
Housing facility (Percentage Nursing home)	0.62	0.53	0.42

Table 2
Comparison of Frailty (VES-13 > 3) and Non-frail subjects

Comparison of Frail (VES-13 > 3) and Non-frail subjects

	Frail (VES-13 > 3)	Non Frail (VES-13 ≤ 3)	
VHI-10 score (median (interquartile range))	6 (2–12)	4 (1–13)	0.5005
Dysphonia (Percentage)	0.29	0.31	0.8185
Age (Percentage ≥ 85)	0.66	0.27	0.0004*
Housing facility (Percentage Nursing home)	0.68	0.21	0.0001*

Table 3
Comparison of dysphonia and frailty in Nursing home and Assisted Living

Comparison of dysphonia and frailty in Nursing home and Assisted living

	Nursing home	Assisted living	
VHI-10	6 (2–14)	4 (1.75–10.5)	0.1154
VES Score (Median (Interquartile Range))	8 (7–9)	4 (3–5.5)	<0.0001*
Dysphonia (Percentage)	0.33	0.23	0.4194
Frailty	0.91	0.56	0.0001*

Table 4
Comparison of dysphonia and frailty in Age < 85 and Age ≥ 85

Comparison of dysphonia and frailty in Age < 85 and Age ≥ 85

	Age < 85	Age ≥ 85	
VHI-10 (Median (Interquartile range))	4(1–11.5)	6.5 (2–13)	0.1489
VES Score (Median (Interquartile Range))	6 (2–7)	9 (5–9)	<0.0001*
Dysphonia (Percentage)	0.27	0.31	0.8391
Frailty (Percentage)	0.59	0.88	0.0004*