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ORIGINAL RESEARCH

Laryngoscope Investigative Otolaryngology

Prevalence of self-reported voice and swallowing complaints in an outpatient geriatric population

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Abstract

Background: Older adults suffer from increased rates of dysphagia and dysphonia, both of which have a profound effect on quality of life and are often underdiagnosed. We sought to better understand the prevalence of these complaints and the potential utility of a patient-reported screening program in a geriatrics clinic.

Methods: Using an IRB-approved cross-sectional survey and retrospective cohort design, we recruited participants from a population of new patients seeking care at an academic geriatrics clinic. We used three validated questionnaires to assess self-reported dysphagia, dysphonia, and pill dysphagia: the Eating-Assessment Tool-10 (EAT-10), the Voice Handicap Index-10 (VHI-10), and the PILL-5. Patients who screened positive on any questionnaire were offered referral to a laryngologist for additional evaluation. Patients who screened positive on the PILL-5 were also offered referral to our geriatric pharmacist.

Results: Among our 300 patients surveyed, the mean age was 76 (SD 8.46). A total of 82 (27.3%) patients screened positive (73 on EAT-10, 10 on PILL-5, 13 on VHI-10) and were offered referral, of which 36 accepted. These positive screening patients took more prescription medications ($p = .024$) and had a higher GDS score ($p < .001$) when compared to the patients who screened negative.

Conclusions: Many new patients seeking generalized care at our center screened positively for dysphagia and/or dysphonia on validated questionnaires. Geriatric patients may benefit from integrating screening for these disorders to identify the need of further evaluation. It is unknown if these survey tools are appropriate in a non-otolaryngology clinic.

Level of evidence: III.

KEYWORDS

dysphagia, dysphonia, geriatrics, pill-dysphagia, presbyphagia, presbyphonia, self-reported outcome measure

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1 | INTRODUCTION

Older adults exhibit increased rates of swallowing dysfunction, known as dysphagia, which is often overlooked and insufficiently addressed in primary care.[1] The significance of healthy swallowing extends beyond enhancing quality of life; it is integral to averting serious medical complications such as aspiration pneumonia, malnutrition, weight loss, and a diminished life expectancy.[2,3] Despite its profound implications, there is limited data describing the prevalence of dysphagia among older adults, which is significant given the global demographic shift toward an aging population.[2] Compounded by the misconception that swallowing difficulties are intrinsic to old age, older adults may refrain from reporting such concerns, leading to compromised dietary intake and delayed treatment.[2] Pill dysphagia introduces the additional risk of pill retention and poor medication compliance.[4]

Several tools have been developed to screen and quantify dysphagia severity. The Eating-Assessment Tool-10 (EAT-10) is widely used among otolaryngologists for gauging dysphagia severity. The PILL-5 instrument, developed in 2019, is the first self-administered measure for the severity of pill dysphagia.[4–6]

Dysphonia significantly impacts quality of life by impairing communication with spouses, family, friends, co-workers, and caregivers, leading to social isolation, depression, and anxiety.[7,8] The reported incidence of voice-related concerns among older adults ranges from 12% to 35%.[7,9,10] A systematic review highlighted limitations in the quality and reliability of existing data and emphasized the need for reliable voice instruments.[11] A notable example is the Voice Handicap Index-10 (VHI-10), a validated tool widely embraced by speech pathologists and ENT physicians.[12] Its established reliability makes it a valuable instrument in obtaining accurate insights into the prevalence and impact of voice disorders.

Given the impact of voice and swallowing difficulties on the quality of life of older adults and the likely underestimation of their prevalence, there is a need for studies providing a more accurate understanding of dysphagia and dysphonia in this population. This study aims to achieve this goal through the administration of the VHI-10, EAT-10, and PILL-5 questionnaires, tools developed by otolaryngologists and validated through younger normal and older treatment-seeking populations. These tools have not been previously employed in a primary care setting as screening instruments.[4,5,12]

Our objectives sought to: (1) determine the prevalence of self-reported voice and swallowing complaints in an elderly population; (2) determine the medical and demographic factors associated with having elevated scores on the voice and swallow screenings; and (3) evaluate the impact of a screening program for voice and swallowing complaints on referral and completion of ENT specialty appointments.

2 | METHODS

2.1 | Study design

Approval for this study was obtained by the Cleveland Clinic Institutional Review Board. The first part of the study consisted in a cross-sectional survey design, where the prevalence of self-reported voice and swallowing complaints among our population was evaluated at a single point in time. All patients who were surveyed were then included in a retrospective cohort study. Demographic and medical data were gathered via chart review. Geriatric Depression Scores were collected.

Significant patient reported voice and swallowing complaints were defined as having EAT-10 scores ≥3, VHI-10 scores >11, and PILL-5 scores >6 based on the validation studies for these survey tools. These patients were offered a referral to otolaryngology. We tracked how many patients accepted referral to ENT and completed an office visit. Of those patients seen by an otolaryngologist, we followed diagnosis and management. For reference, a baseline rate of referral to ENT for new geriatric patients was compiled over a 9-month period, immediately prior to our survey period. This allowed assessment of our survey intervention on the rate of referral to ENT for voice and swallowing complaints.

Patients with PILL-5 scores > 6 were also offered referral to the geriatric pharmacist. Interventions, such as pill crushing or alternative formulations were tracked and reported.

2.2 | Protocol

The study was conducted from September 1, 2021 to April 21, 2022. Participants were recruited from a population of new patients seeking care at the geriatrics clinic located at the Cleveland Clinic Main Campus. As standard of care, the geriatric office staff administered a Montreal Cognitive Assessment (MOCA) or Mini-Mental State Examination (MMSE) and a Geriatric Depression Screen (GDS) to all new geriatric patients. A FRAIL score was also calculated for all patients. Recruitment occurred after these assessments were given and before the geriatrician saw the patient. EAT-10, VHI-10, and the PILL-5 surveys were provided to patients. As these tools are validated for self-administration, exclusion criteria included patients who were unable to complete their MMSE or MOCA and patients who did not have decision-making capacity.

Basic demographic, medical, visit and referral data was collected from the electronic medical record and stored in REDCAP for all patients in the study. During the study period, we tracked the "positivity" rate on each survey. Sample size was calculated to reach a statistical power of 80%.

2.3 | Statistical analysis

The prevalence of each disorder (dysphagia, pill dysphagia, and dysphonia) was calculated. A 95% confidence interval for the prevalence of each disorder was calculated in JMP Pro 16 software using the number of positive patients on each survey, our total sample size of 300, and our desired confidence level of 95%. To determine demographical and medical differences between patient who screened positively compared to negatively, the statistical analysis was conducted by comparing the high score group against the low score group for each survey, and for a combined screened positive

cohort. Categorical variables were compared between the groups using Chi-square or Fisher's exact tests, whereas continuous variables were compared using a Student's *t*-test or a Wilcoxon rank sum test.

3 | RESULTS

3.1 | Primary prevalence results

We surveyed patients seeking generalized care at a tertiary center outpatient geriatrics clinic from September 1, 2021 to April 21, 2022. Four hundred and fifteen patients were encountered for survey and participation. Three hundred patients were included in the study. The rest of the patients were excluded as per our exclusion criteria. Of those, 66 patients were excluded due to cognitive impairment and 49 patients declined to participate (Figure 1).

Among our 300 patients surveyed, the mean age was 76 (SD 8.46). Fifty-six percent of patients were female, and the racial background was 68.3% white, 28% African American, 2.3% Asian, 0.3% Hispanic, and 0.7% unknown. Eighty-five percent of our patients were from Ohio. Fifteen percent of our patients had a history of stroke or transient ischemic attack (TIA). Seventy-three percent were referred by a physician and the other 27% were self-referred.

The most common primary reason visit was memory or cognitive issues (45%), followed by other issues (31%), pre-operative visit (17%), and establishing care (7%). The median MOCA score was 24, the median MMSE score was 22.5, and the median GDS score was 3. The full demographics of the cohort are listed below in Table 1.

A total of 82 patients (27.3%) screened positive on our surveys. The breakdown showed 73 patients (24.3%) who screened positive on the EAT-10, 15 patients (5.0%) screened positive on the PILL-5, and 24 patients (8.0%) screened positive on the VHI-10. Fourteen of the 15 (94%) patients who were positive on the PILL-5 were also positive on the EAT-10. Sixteen of the 24 (67%) patients who were positive on the VHI-10 were also positive on the EAT-10. True prevalence of these disorders was calculated in our cohort of patient (Table 2).

When comparing the combined "Survey Positive" group to the "Survey Negative" group, the patients who screened positive took more prescription medications ($p = .024$) and had a higher GDS score ($p < .001$) when compared to the patients who screened negative (Table 3). Notably, the two groups did not differ in terms of MOCA score ($p = .20$), MMSE score ($p = .30$), or history of stroke or TIA ($p = .8$).

When looking specifically at the EAT-10 regarding "Survey Positive" versus "Survey Negative" the same trends as above held true (Table 4).

Regarding PILL-5 and VHI-10 questionnaires, the patients who screened positive on either the PILL-5 or VHI-10 had a higher GDS score ($p = .014$ and $p < .001$ respectively) when compared to the patients who screened negative on those questionnaires (Tables 5 and 6). There was a statistically significant association between frailty as defined by FRAIL Scale for VHI-10, however it was not the case for the Clinical Frailty Scale for this group.

3.2 | Baseline rate of referral

Baseline rate of referral from geriatrics to ENT was calculated during the 9-month time period immediately prior to the beginning of our study (between December 1, 2020, and August 31, 2021). A total of 652 new patient visits were registered. Among those patients, only two patients were referred to ENT for reasons differing from dysphagia and dysphonia. Of note, 10 patients were referred to speech pathology during that time period. Reasons for referral included cognitive speech therapy, pharyngeal dysphagia, and assessment with

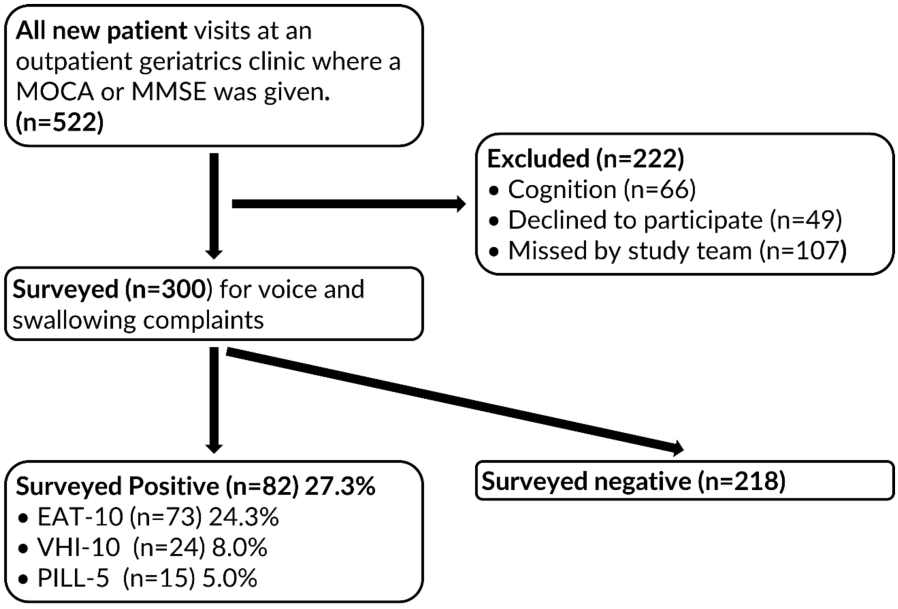

FIGURE 1 Study flow diagram.

TABLE 1 Clinical characteristics of the entire cohort.

Characteristic	$N = 300$[a]
Gender	
Female	168 (56%)
Male	132 (44%)
Age at evaluation (years)	76 (70,82)
Race/ethnicity	
Asian	7 (2.3%)
Black or African American	84 (28%)
Hispanic	1 (0.3%)
Multiracial	1 (0.3%)
Unavailable	2 (0.7%)
White	205 (68%)
Smoking status	
Current use	16 (5.3%)
Former use (quit >3 months ago)	149 (50%)
Never smoker	135 (45%)
Pack years	19 (8, 40)
Unknown	168
Is the patient from Ohio?	256 (85%)
History of stroke or TIA?	45 (15%)
Referred to geriatrics by self or physician?	
Physician	218 (73%)
Self	82 (27%)
Primary reason for geriatric visit	
Anything else	93 (31%)
Establish care	21 (7.0%)
Memory or cognitive issues	136 (45%)
Pre-op	50 (17%)
Number of prescription medications	7 (4, 10)
Number of total medications	10 (7, 15)
MOCA score	24 (20, 27)
Unknown	31
MMSE score	22.5 (20.8, 24.8)
Unknown	272
GDS score	3 (1, 5)
Unknown	3
Highest level of education	
College or higher (0 points)	231 (77%)
High school graduate or GED (1 point)	49 (16%)
Some high school or lower (MMSE)	20 (6.7%)
FRAIL Scale score	
0	52 (54%)
1	15 (15%)
2	14 (14%)
3	13 (13%)
4	1 (1.0%)
5	1 (1.0%)
6	1 (1.0%)
Unknown	203
Clinical Frailty Scale (1–9)	
1	9 (20%)
2	8 (18%)
3	8 (18%)
4	5 (11%)
5	9 (20%)
6	5 (11%)
Unknown	256

[a]*n* (%); median (25%, 75%).

TABLE 2 True prevalence of the disorders in our cohort of patient.

Disorder	Prevalence (%, 95% CI)
Dysphagia	24.3 ± 4.86
Dysphonia	5 ± 2.47
Pill dysphagia	8 ± 3.07

modified barium swallow examination. Of these 10 patients, four patients presented for their evaluation in that time period.

The baseline rate of referral for dysphagia and dysphonia to ENT was 0%. The rate of referral to speech pathology for dysphagia was 0.5%. Thus, the number-needed-to-screen with our surveys to identify one patient who would not have been previously identified was five for dysphagia and 13 for dysphonia.

3.3 | Referral follow-up results

All patients who surveyed positive in either of the three surveys ($n = 82$) were offered referral to ENT. Of these, 36 patients (43.9%) accepted referral, and 13 showed to an appointment. Among the 46 patients who declined the referral, their reasons for declining included another active medical issue (21), complaint not viewed as a significant problem (24), out of state (3), too busy (3), and already being seen by ENT (3).

Out of the 13 patients who presented for their referral to ENT, 10 patients had modified barium swallow studies ordered and six modified barium swallows were completed. Of the six patients who completed an MBS, five studies showed a diagnosis of oral or pharyngeal dysphagia. All dysphagia diagnoses were labeled as mild to moderate. Outpatient speech therapy was recommended for all five patients. A normal diet was recommended for two patients and modified diet for three patients.

Still among the 13 patients who presented for their referral appointments with ENT, 8 voice disorders were diagnosed including

TABLE 3 Clinical characteristics by combined survey results.

Characteristic	Survey negative, $N = 218$[a]	Survey positive, $N = 82$[a]	*p*-Value
Gender			.30[b]
Female	118 (54%)	50 (61%)	
Male	100 (46%)	32 (39%)	
Race/ethnicity			>.90[c]
Asian	5 (2.3%)	2 (2.4%)	
Black or African American	60 (28%)	24 (29%)	
Hispanic	1 (0.5%)	0 (0%)	
Multiracial	1 (0.5%)	0 (0%)	
Unavailable	2 (0.9%)	0 (0%)	
White	149 (68%)	56 (68%)	
Smoking status			.30[c]
Current use	14 (6.4%)	2 (2.4%)	
Former use (quit >3 months ago)	110 (50%)	39 (48%)	
Never smoker	94 (43%)	41 (50%)	
Pack years	19 (8, 40)	18 (9, 38)	.60[d]
Unknown	118	50	
History of stroke or TIA?	32 (15%)	13 (16%)	.80[b]
Age at evaluation (years)	76 (70, 82)	78 (71, 82)	.60[d]
Referred to geriatrics by self or physician?			.90[b]
Physician	159 (73%)	59 (72%)	
Self	59 (27%)	23 (28%)	
Primary reason for geriatric visit			.50[b]
Anything else	63 (29%)	30 (37%)	
Establish care	17 (7.8%)	4 (4.9%)	
Memory or cognitive issues	102 (47%)	34 (41%)	
Pre-op	36 (17%)	14 (17%)	
Number of prescription medications	6 (4, 9)	8 (5, 11.8)	**.024**[d]
Number of total medications	10 (7, 14)	12 (7, 17)	.12[d]
MOCA score	24 (21, 27)	23.0 (19, 26.5)	.20[d]
Unknown	24	7	
MMSE score	22 (20, 24)	24.0 (22, 27.5)	.30[d]
Unknown	197	75	
GDS score	2 (1, 4)	4 (2, 6)	**<.001**[d]
Unknown	3	0	
FRAIL Scale score			.40[c]
0	41 (55%)	11 (50%)	
1	12 (16%)	3 (14%)	
2	11 (15%)	3 (14%)	
3	10 (13%)	3 (14%)	
4	0 (0%)	1 (4.5%)	
5	1 (1.3%)	0 (0%)	
6	0 (0%)	1 (4.5%)	
Unknown	143	60	
Clinical Frailty Scale (1–9)			.20[c]
1	8 (25%)	1 (8.3%)	
2	8 (25%)	0 (0%)	

(Continues)

TABLE 3 (Continued)

Characteristic	Survey negative, $N = 218$[a]	Survey positive, $N = 82$[a]	*p*-Value
3	5 (16%)	3 (25%)	
4	3 (9.4%)	2 (17%)	
5	5 (16%)	4 (33%)	
6	3 (9.4%)	2 (17%)	
Unknown	186	70	
Unknown	4	1	

Note: Bold values show statistically significant data.
[a]*n* (%); median (IQR).
[b]Pearson's Chi-squared test.
[c]Fisher's exact test.
[d]Wilcoxon rank sum test.

presbylarynx with vocal fold bowing or atrophy with or without hyperfunction (11), dysarthria (1), and vocal tremor (1), Five patients were offered voice therapy, three declined, one accepted and one was already attending voice therapy at an outside center.

4 | DISCUSSION

We sought to assess the self-reported prevalence of voice and swallowing complaints in an elderly population using validated voice and swallowing questionnaires in a non-otolaryngology, primary care setting. We aimed to further elucidate the medical and demographic factors associated with presenting these complaints. Our study also intended to help evaluate the utility and impact of screening for voice and swallowing complaints in a primary care setting using these validated surveys.

Dysphagia was reported as score ≥3 in the EAT-10 questionnaire. Our result showed dysphagia to be reported in 24.3% of our geriatric cohort. This prevalence falls within the values previously estimated, often cited as between 11.4% and 33.7% among independently living older adults.[13]

Pill dysphagia was reported in 5% of our studied cohort. In a recent survey based study, 83% of participants stated taking several pills daily, and almost half had to use special techniques like drinking lots of liquids or performing forceful swallows.[14] A meta-analysis of five studies from 2016 suggested that around 14% of community-dwelling older patients experience difficulty swallowing medications.[13,15] Our study found a lower prevalence (5%) compared to these previous reports. We are the first to use the new PILL-5 tool for a prevalence study, which may offer a stricter and more accurate definition of pill dysphagia. This could explain why our results appear lower than what is described in the existing literature, as we focused on a more precise identification of the medical disorder rather than occasional reported difficulties.

The prevalence of dysphonia in our population was 8%. The reported incidence of voice complaints in the literature in the geriatric population is estimated to be between 12% and 35%.[7–9] There however appears to be methodological discrepancies among the studies, leading to the conclusion that the prevalence estimates were lacking reliability.[11] Despite our estimated prevalence being significantly lower than previous reports, this study stands out as a more comprehensive assessment of how dysphonia in the elderly is perceived in a primary care setting.

Our second objective was to determine the medical and demographic factors associated with having high scores on the voice and swallow screenings. A result that stood out from our analysis is the association noted between a positive screen in any of the questionnaires and a higher GDS score. In fact, in our combined "survey positive" group, as well as in all three of each survey's subgroup analyses (EAT-10, PILL-5, and VHI-10), patients who screened positive had a higher GDS score compared to patients who screen negative ($p < .001$). This strong association contributes to illustrate the known psychosocial burden that swallowing and voice disorders carry. This results supports the well described psycho-social consequences describes in dysphagia.[2,3] However, we believe the relationship with the GDS score may be bidirectional, meaning that patients who show clinical signs of major depression may be more likely to select higher numbers in response to the survey questions.

Another outstanding result from our analysis arises from the association between polypharmacy and screening positive on the EAT-10. The reasoning remains unclear. One hypothesis was the potential association of polypharmacy with adverse health outcomes in older people. This remains debated, however, as frailty remains the most important factor for hospital admissions and mortality.[16] Interestingly, despite the well-established status of a history of stroke or TIA as a recognized risk factor for dysphagia, our analysis did not reveal a statistically significant association with a positive screen in the EAT-10 group. This lack of association can be explained by possibly a sample size issue as our study was not specifically powered to assess this relationship. Notably, 15% of survey negative patients and 14% of survey positive patients had a history of stroke or TIA. This 1% difference is nor clinically or statistically significant. We also did not ascertain the location or physical sequelae of these strokes. This also can illustrate the bias of the retrospective data collection. Finally, Clinical Frailty Scale scores were inconsistently reported, so our ability to

TABLE 4 Clinical characteristics by EAT-10 results.

Characteristic	Survey negative, $N = 227$[a]	Survey positive, $N = 73$[a]	*p*-Value
Gender			.80[b]
Female	126 (56%)	42 (58%)	
Male	101 (44%)	31 (42%)	
Race/ethnicity			>.90[c]
Asian	5 (2.2%)	2 (2.7%)	
Black or African American	63 (28%)	21 (29%)	
Hispanic	1 (0.4%)	0 (0%)	
Multiracial	1 (0.4%)	0 (0%)	
Unavailable	2 (0.9%)	0 (0%)	
White	155 (68%)	50 (68%)	
Smoking status			.40[c]
Current use	14 (6.2%)	2 (2.7%)	
Former use (quit >3 months ago)	115 (51%)	34 (47%)	
Never smoker	98 (43%)	37 (51%)	
Pack years	20 (8, 40)	17 (10, 40)	.60[d]
Unknown	124	44	
History of stroke or TIA?	35 (15%)	10 (14%)	.70[b]
Age at evaluation (years)	76 (70, 82)	78 (71, 82)	.70[d]
Referred to geriatrics by self or physician?			.80[b]
Physician	164 (72%)	54 (74%)	
Self	63 (28%)	19 (26%)	
Primary reason for geriatric visit			.60[b]
Anything else	67 (30%)	26 (36%)	
Establish care	17 (7.5%)	4 (5.5%)	
Memory or cognitive issues	107 (47%)	29 (40%)	
Pre-op	36 (16%)	14 (19%)	
Number of prescription medications	6.0 (4.0, 9.0)	8.0 (5.0, 12.0)	**.024**[d]
Number of total medications	10 (7, 14)	11 (7, 18)	.13[d]
MOCA score	24 (21, 27)	23 (19, 26)	.11[d]
Unknown	24	7	
MMSE score	22 (20, 24)	24 (22, 27.5)	.30[d]
Unknown	206	66	
GDS score	2 (1, 4)	4 (2, 6)	**<.001**[d]
Unknown	3	0	
FRAIL Scale score			.60[c]
0	43 (55%)	9 (47%)	
1	12 (15%)	3 (16%)	
2	11 (14%)	3 (16%)	
3	10 (13%)	3 (16%)	
4	0 (0%)	1 (5.3%)	
5	1 (1.3%)	0 (0%)	
6	1 (1.3%)	0 (0%)	
Unknown	149	54	
Clinical Frailty Scale (1–9)			.20[c]
1	8 (24%)	1 (9.1%)	
2	8 (24%)	0 (0%)	

(Continues)

TABLE 4 (Continued)

Characteristic	Survey negative, $N = 227$[a]	Survey positive, $N = 73$[a]	*p*-Value
3	5 (15%)	3 (27%)	
4	3 (9.1%)	2 (18%)	
5	5 (15%)	4 (36%)	
6	4 (12%)	1 (9.1%)	
Unknown	194	62	

Note: Bold values show statistically significant data.
[a]*n* (%); median (IQR).
[b]Pearson's Chi-squared test.
[c]Fisher's exact test.
[d]Wilcoxon rank sum test.

explore this relationship between increasing frailty and dysphagia and dysphonia was limited.

An additional objective of this study was to evaluate the potential impact of a screening program for voice and swallowing complaints in an elderly population using these surveys which have until now been used exclusively in treatment seeking otolaryngology clinics. We sought to explore this impact through rate of referral to ENT specialty and completion of appointments. The baseline rate of referral of our tertiary geriatric center to ENT for dysphagia and dysphonia was 0%. The rate of referral to speech pathology for dysphagia was 0.5%. These findings were consistent with the literature.[1–3] A review article from 2017 stated that dysphagia is seldomly screened and treated in the primary care clinical setting, and overall awareness among the medical and geriatric community is limited.[17] Therefore, our program increased the identification of these disorders by incorporating routine screening during the study period. A total of 82 patients (27.3%) were screened positive for either dysphagia, pill dysphagia or dysphonia. Considering the brief time required for participants to complete these surveys, along with the possibility of filling them out before a physician visit, the screening program implemented in our study offers a substantial benefit with minimal effort.

Out of the 82 patients offered referral, only 36 (43.9%) accepted the referral, and only 13 patients showed for appointments. Of the patients who declined the referral, 24 patients (29.2%) declined stating they did not feel the problem to be significant. Other reasons for declining the referral included patients seeing many different physicians and had other health concerns that they were prioritizing. These 29.2% patients may represent false positives, in a context were their symptoms of dysphagia and dysphonia were not severe enough to justify further investigation. The patient reported surveys EAT-10, VHI-10, and PILL-5 were validated in a treatment seeking population of otolaryngology patients for dysphagia or dysphonia symptoms respectively.[4,5,12] Questions can arise here as perhaps these tools are overly sensitive in primary care cohorts.

Also, the validation of the questionnaires encompassed a population across various age groups, with no specific emphasis on a particular age range, particularly not within the geriatric population. It is plausible that these questionnaires may exhibit increased sensitivity when applied to an aging demographic.

Looking specifically at the rate of appointment completion, out of the 36 patients who accepted the referral, only 13 patients actually showed for appointment. Our study took place during the COVID-19 pandemic, specifically during the Omicron surge in January 2022. This situation could have represented a limitation because it might have caused more reticence for people to attend in-person appointments. Additionally, older patients often encounter challenges in accessing medical care. Studies have demonstrated that older individuals tend to miss more appointments compared to the general primary care population.[18] Another explanation for the low rate of appointment completion could be the severity of the symptoms. In other words, some patients might have thought their symptoms were not severe enough to justify time, effort, and cost associated with an additional appointment with otolaryngology. As mentioned earlier discussed, perhaps the screening questionnaires are too sensitive for a primary care setting, particularly among older adults.

Of the 13 patients seen in otolaryngology, the majority received a voice or dysphagia-related diagnosis. Eight patients were received a diagnostic of a specific voice disorders and five of oral or pharyngeal dysphagia. None of these issues were however reported as severe and no referral resulted in a surgical intervention. It is possible that geriatric patients with more severe issues are referred to otolaryngology directly rather than through a screening program.

It is also worth noting that the referrals were offered by a member of the study team within the context of research. Perhaps if the referrals were offered by a physician within the context of a comprehensive geriatric evaluation, more patients would have accepted the referral or completed their otolaryngology appointments.

A limitation in external validity is that our prevalence estimate is drawn solely from our patient population. Our patient population consists of a mixture of primarily community-dwelling and some facility-dwelling patients. One could reasonably infer that patients who seek geriatric care is different when compared to the average community-dwelling older adult in America. Furthermore, our study draws from patients residing primarily in the Northeast Ohio area. Although we had strong representation from the African American community (28%), our study population was only 2.3% Asian and 0.3% Hispanic. Thus, the demographics of our specific patient

TABLE 5 Clinical characteristics by PILL-5 results.

Characteristic	Survey negative, $N = 285$[a]	Survey positive, $N = 15$[a]	*p*-Value
Gender			.40[b]
Female	158 (55%)	10 (67%)	
Male	127 (45%)	5 (33%)	
Race/ethnicity			.40[c]
Asian	7 (2.5%)	0 (0%)	
Black or African American	77 (27%)	7 (47%)	
Hispanic	1 (0.4%)	0 (0%)	
Multiracial	1 (0.4%)	0 (0%)	
Unavailable	2 (0.7%)	0 (0%)	
White	197 (69%)	8 (53%)	
Smoking status			>.90[c]
Current use	16 (5.6%)	0 (0%)	
Former use (quit >3 months ago)	142 (50%)	7 (47%)	
Never smoker	127 (45%)	8 (53%)	
Pack years	19 (8, 40)	20 (15, 36)	.80[d]
Unknown	159	9	
History of stroke or TIA?	43 (15%)	2 (13%)	>.90[c]
Age at evaluation (years)	77 (70, 82)	76 (70, 82)	.90[d]
Referred to geriatrics by self or physician?			>.90[c]
Physician	207 (73%)	11 (73%)	
Self	78 (27%)	4 (27%)	
Primary reason for geriatric visit			.20[c]
Anything else	91 (32%)	2 (13%)	
Establish care	20 (7.0%)	1 (6.7%)	
Memory or cognitive issues	125 (44%)	11 (73%)	
Pre-op	49 (17%)	1 (6.7%)	
Number of prescription medications	7.0 (4.0, 10.0)	7.0 (5.5, 10.0)	.60[d]
Number of total medications	10 (7, 15)	11 (8, 14)	.90[d]
MOCA score	24.0 (20.5, 27.0)	23.0 (19.0, 24.0)	.083[d]
Unknown	30	1	
MMSE score	22.0 (20.5, 24.0)	27.0 (27.0, 27.0)	.30[d]
Unknown	258	14	
GDS score	3.00 (1.00, 4.75)	5.00 (3.00, 7.00)	**.014**[d]
Unknown	3	0	
FRAIL Scale score			.60[c]
0	50 (54%)	2 (50%)	
1	14 (15%)	1 (25%)	
2	14 (15%)	0 (0%)	
3	12 (13%)	1 (25%)	
4	1 (1.1%)	0 (0%)	
5	1 (1.1%)	0 (0%)	
6	1 (1.1%)	0 (0%)	
Unknown	192	11	
Clinical Frailty Scale (1–9)			.20[c]
1	9 (21%)	0 (0%)	
2	8 (19%)	0 (0%)	

(Continues)

TABLE 5 (Continued)

Characteristic	Survey negative, $N = 285$[a]	Survey positive, $N = 15$[a]	*p*-Value
3	8 (19%)	0 (0%)	
4	5 (12%)	0 (0%)	
5	7 (17%)	2 (100%)	
6	5 (12%)	0 (0%)	
Unknown	243	13	

Note: Bold values show statistically significant data.
[a]*n* (%); median (IQR).
[b]Pearson's Chi-squared test.
[c]Fisher's exact test.
[d]Wilcoxon rank sum test.

TABLE 6 Clinical characteristics by VHI-10 results.

Characteristic	Survey negative, $N = 276$[a]	Survey positive, $N = 24$[a]	*p*-Value
Gender			.30[b]
Female	152 (55%)	16 (67%)	
Male	124 (45%)	8 (33%)	
Race/ethnicity			>.90[c]
Asian	7 (2.5%)	0 (0%)	
Black or African American	78 (28%)	6 (25%)	
Hispanic	1 (0.4%)	0 (0%)	
Multiracial	1 (0.4%)	0 (0%)	
Unavailable	2 (0.7%)	0 (0%)	
White	187 (68%)	18 (75%)	
Smoking status			.60[c]
Current use	16 (5.8%)	0 (0%)	
Former use (quit >3 months ago)	137 (50%)	12 (50%)	
Never smoker	123 (45%)	12 (50%)	
Pack years	20 (9, 40)	8 (6, 25)	.30[d]
Unknown	153	15	
History of stroke or TIA?	42 (15%)	3 (12%)	>.90[c]
Age at evaluation (years)	76 (71, 82)	76 (70, 81)	.80[d]
Referred to geriatrics by self or physician?			.10[b]
Physician	204 (74%)	14 (58%)	
Self	72 (26%)	10 (42%)	
Primary reason for geriatric visit			.40[c]
Anything else	82 (30%)	11 (46%)	
Establish care	20 (7.2%)	1 (4.2%)	
Memory or cognitive issues	128 (46%)	8 (33%)	
Pre-op	46 (17%)	4 (17%)	
Number of prescription medications	6.5 (4.0, 10.0)	7.5 (5.8, 9.2)	.30[d]
Number of total medications	10 (7, 15)	12 (7, 14)	.70[d]
MOCA score	24.0 (21.0, 27.0)	23.0 (19.0, 27.0)	.30[d]
Unknown	30	1	
MMSE score	22.0 (20.5, 24.0)	28.0 (28.0, 28.0)	.20[d]
Unknown	249	23	
GDS score	3.00 (1.00, 4.00)	5.00 (2.75, 7.00)	**<.001**[d]
Unknown	3	0	

TABLE 6 (Continued)

Characteristic	Survey negative, $N = 276$[a]	Survey positive, $N = 24$[a]	*p*-Value
FRAIL Scale score			**.010**[c]
0	50 (54%)	2 (40%)	
1	15 (16%)	0 (0%)	
2	13 (14%)	1 (20%)	
3	13 (14%)	0 (0%)	
4	0 (0%)	1 (20%)	
5	1 (1.1%)	0 (0%)	
6	0 (0%)	1 (20%)	
Unknown	184	19	
Clinical Frailty Scale (1–9)			.60[c]
1	9 (22%)	0 (0%)	
2	8 (20%)	0 (0%)	
3	7 (18%)	1 (25%)	
4	4 (10%)	1 (25%)	
5	8 (20%)	1 (25%)	
6	4 (10%)	1 (25%)	
Unknown	236	20	

Note: Bold values show statistically significant data.
[a]*n* (%); median (IQR).
[b]Pearson's Chi-squared test.
[c]Fisher's exact test.
[d]Wilcoxon rank sum test.

population most certainly differ from those in other parts of the United States.

5 | CONCLUSION

There is a paucity of data quantifying the prevalence of dysphagia and dysphonia among older adults in the United States, both of which have a profound effect on quality of life and safety. Dysphagia and dysphonia are often underdiagnosed and undertreated. We provided a methodologically robust estimate of the prevalence of these disorders in a group of patients seeking care at an academic geriatrics center using validated, patient reported survey tools from the otolaryngology literature. Our experience demonstrated the feasibility of a routine screening program for voice and swallowing complaints among older adults using these surveys. The questionnaires increased our recognition of self-reported dysphagia and dysphonia complaints. However, the severity and impact of a positive screen, and ultimate impact of otolaryngology referral in a dysphonia and dysphagia screening population is not yet fully defined.

CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest to declare.

DATA AVAILABILITY STATEMENT

All data generated or analyzed during this study are included in this published article.

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