

## ORIGINAL RESEARCH

# Factors associated with adherence to swallowing therapy among patients diagnosed with oropharyngeal dysphagia

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**Abstract**

**Objective:** The objective of this study is to assess disparities in adherence to swallowing therapy for clinically diagnosed oropharyngeal dysphagia (OD) patients.

**Methods:** Analysis was conducted on data from 600 patients with OD and confirmed impairments in swallowing safety and/or efficiency on a videofluoroscopic swallow study. Patients were classified based on their adherence to treatment sessions, defined as the number of swallow treatment sessions attended. The outcome of treatment adherence was categorized into two groups: those who attended fewer than 50% of the prescribed treatment sessions and those who attended 50% or more of the sessions. Continuous variables were presented as mean  $\pm$  standard deviation or median  $\pm$  interquartile range. Categorical variables were compared using Pearson chi-square tests and Fisher's exact test when appropriate. Univariable and multivariable binary logistic regression models were employed to identify factors associated with successful adherence.

**Results:** Approximately 79% adhered to swallowing treatment. We found no significant relationship between adherence and age, sex, race, ethnicity, primary language, marital status, insurance status, occupation, median income, distance, education, OD severity, and diagnosis year ( $p > 0.05$ ). We found no covariables to be significant predictors to swallowing treatment nonadherence in both univariable and multivariable binary regression models ( $p > 0.05$ ).

**Conclusion:** The variables analyzed in this study were not significantly associated with nonadherence to swallow therapy. Nevertheless, our study still addressed an important knowledge gap and future studies would benefit from exploring other relevant socioeconomic and disease-related factors.

**Level of evidence:** Level 4.

**KEYWORDS**

health disparities, oropharyngeal dysphagia, swallowing treatment, videofluoroscopic swallowing studies

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## 1 | INTRODUCTION

Oropharyngeal dysphagia (OD) is a condition characterized by difficulty in passing food or liquids boluses during the oropharyngeal stage of swallowing. Its prevalence varies widely between 1.7% and 55.2% in the general population, depending on age and underlying causes.<sup>1</sup> OD is commonly associated with neurological (i.e., Parkinson disease, stroke), immunological (i.e., multiple sclerosis, systemic sclerosis), gastroesophageal (i.e., esophageal stricture, Zenker diverticulum), congenital disorders (i.e., prematurity, cerebral palsy), and other conditions (i.e., head and neck cancer, post-radiation treatment, infections, surgical complications).<sup>1</sup> OD affects between 16% and 33% of independently living older persons and over 50% of older nursing home residents.<sup>2</sup> The high prevalence among the elderly is attributed to age-related factors such as neuromuscular weakness and swallowing discoordination.<sup>3</sup>

Untreated and unrecognized OD can have serious consequences, including aspiration, malnutrition, chest infection, dehydration, decreased quality of life (QoL), and even death.<sup>4</sup> Unfortunately, several studies show that many dysphagia patients either delay evaluation and treatment or fail to do so altogether.<sup>5-9</sup> One study found that 64% of patients expressed concerns about their swallowing problems, but only 46.3% had sought an evaluation.<sup>7</sup> Another study analyzed data from a 2012 National Health Interview Survey and showed that 9.44 million Americans reported having a swallowing problem, but only 22.6% of them sought help from a physician in the preceding 12 months.<sup>8</sup> Due to these findings, it is important to identify the major barriers to treatment seeking and treatment adherence.

Few studies have identified factors associated with seeking treatment for dysphagia.<sup>7,10</sup> For example, Zheng et al.<sup>10</sup> recently showed that women, individuals of lower income, the unemployed, those without a college degree, and those with private insurance were more likely to report dysphagia but less likely to seek treatment. On the contrary, younger adults and minority groups (Blacks, Hispanics) were less likely to report dysphagia but showed a higher tendency to seek treatment, possibly indicating that these latter groups sought medical assistance when their swallowing function became severely impaired.

Although there are numerous studies that have explored disparities in treatment attendance in dysphonia and laryngeal cancer patients, there is a paucity of literature investigating this aspect in dysphagia patients.<sup>11</sup> In light of this gap, our study aimed to analyze demographic, socioeconomic, and health care-related disparities regarding adherence to swallowing therapy in clinically diagnosed individuals with OD.

## 2 | METHODS AND MATERIALS

This retrospective cohort study was approved by the New York University Langone Health (NYULH) Institutional Review Board (protocol: i23-00289). This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline.<sup>12</sup>

### 2.1 | Inclusion and exclusion criteria

A retrospective chart review of electronic medical records was conducted on OD patients at the New York University (NYU) voice center between January 2016 and April 2023. Patients were included if they were 18 years or older, clinically diagnosed with OD by speech-language pathologists (SLPs) utilizing VFSS (scored according to the Modified Barium Swallow Impairment Profile [MBSImp] and the Penetration Aspiration Scale (PAS)) and recommended for a minimum of six treatment sessions. Patients who were not recommended for swallowing treatment were excluded. Furthermore, OD patients who were advised to seek treatment but opted for a more local option were also excluded. Our final cohort size after inclusion and exclusion criteria was 600 OD patients.

### 2.2 | Impact of the COVID-19 pandemic on swallowing treatment adherence

To account for the influence of the COVID-19 pandemic, patients who initiated therapy in 2020 were excluded from the study. Adherence was compared between two time periods: 2016–2019 and 2021–2023.

### 2.3 | Outcomes

The outcome of treatment adherence was categorized into two groups: those who attended fewer than 50% of the prescribed treatment sessions and those who attended 50% or more of the sessions. Rubino and Abbott conducted a scoping review, which encompassed 19 studies on voice therapy adherence, revealing that different authors utilized distinct benchmarks to determine successful adherence.<sup>13</sup> We adopted a binary classification akin to Vamosi et al., who categorized patients into groups based on whether they attended <50% or ≥50% of their scheduled voice therapy sessions.<sup>14</sup>

### 2.4 | Predictors

Demographic and clinical data were collected, including age, gender (male/female), race (White, non-White), ethnicity (Hispanic, non-Hispanic), marital status (married, single/partner/significant other, divorced/separated/widowed), primary language (English, non-English), primary insurance status (public [Medicare/Medicaid], private), and severity of OD based on clinical impressions using VFSS data. Due to the homogeneity of our cohort, some variables (i.e., race, primary language) were collapsed into fewer levels to facilitate statistical analysis. Patient's home zip code was recorded to calculate distance to the voice center (miles), and we obtained information on median income level and education level (% with at least a bachelor's degree) based on zip codes using the American Community Survey (ACS) 5-Year Data (2017–2021). Census data was grouped into quartiles.<sup>15</sup>

**TABLE 1** Demographics and other characteristics of N = 600 oropharyngeal dysphagia patients diagnosed based on adherence proportion.

	All		<50%		≥50%		p
	n	%	n	%	n	%	
All	600		126	21.0	474	79.0	
<b>Age (years)</b>							.973
≥65	441	73.5	93	73.8	348	73.4	
46–64	118	19.7	24	19.0	94	19.8	
≤45	41	6.8	9	7.1	32	6.8	
<b>Sex</b>							.454
Male	365	60.8	73	57.9	292	61.6	
Female	235	39.2	53	42.1	182	38.4	
<b>Race</b>							.713
White	508	84.7	108	85.7	400	84.4	
Non-White	92	15.3	18	14.3	74	15.6	
<b>Ethnicity</b>							.382
Non-Hispanic	587	97.8	122	96.8	465	98.1	
Hispanic	13	2.2	4	3.2	9	1.9	
<b>Primary language</b>							.309
English	568	94.7	117	92.9	451	95.1	
Non-English	32	5.3	9	7.1	23	4.9	
<b>Marital status</b>							.319
Married	347	57.8	75	59.5	272	57.4	
Single/partner/significant other	147	24.5	25	19.8	122	25.7	
Separated/divorced/widowed	106	17.7	26	20.6	80	16.9	
<b>Insurance status</b>							.376
Private	246	41.0	56	44.4	190	40.1	
Public (Medicare/Medicaid)	354	59.0	70	55.6	284	59.9	
<b>Occupation</b>							.700
Employed	175	29.2	35	27.8	140	29.5	
Retired/unemployed	425	70.8	91	72.2	334	70.5	
<b>Median income</b>							.284
≥84,308	152	25.3	34	27.0	118	24.9	
58,115–84,307	149	24.8	23	18.3	126	26.6	
38,938–58,114	147	24.5	33	26.2	114	24.1	
≤38,937	152	25.3	36	28.6	116	24.5	
<b>Distance to facility (miles)</b>							.050
≤1.64	169	28.2	35	27.8	134	28.3	
1.65–3.56	133	22.2	21	16.7	112	23.6	
3.57–10.49	151	25.2	28	22.2	123	25.9	
≥10.50	147	24.5	42	33.3	105	22.2	
<b>Education (% with at least a bachelor's degree)</b>							.392
≥82%	148	24.7	32	25.4	116	24.5	
65%–81%	154	25.7	25	19.8	129	27.2	
42%–64%	149	24.8	34	27.0	115	24.3	
≤41%	149	24.8	35	27.8	114	24.1	
<b>Dysphagia severity</b>							.244
Mild	320	53.3	69	54.8	251	53.0	
Mild to moderate	267	44.5	52	41.3	215	45.4	

(Continues)

TABLE 1 (Continued)

	All		<50%		≥50%		p
	n	%	n	%	n	%	
Severe	13	2.2	5	4.0	8	1.7	
<b>Attendance year</b>							.665
2016–2019	395	65.8	85	67.5	310	65.4	
2021–2023	205	34.2	41	32.5	164	34.6	

TABLE 2 Univariable (UVA) and multivariable (MVA) binary regression analysis of adherence to &lt;50% of recommended swallowing therapy sessions (N = 600).

	A. UVA model			B. MVA model		
	OR	95% CI	p	aOR	95% CI	p
<b>Age (years)</b>						
≥65	1 (ref)			1 (ref)		
46–64	1.047	0.633–1.731	.859	1.379	0.745–2.555	.306
≤45	0.95	0.438–2.061	.897	1.059	0.433–2.587	.9
<b>Sex</b>						
Male	1 (ref)			1 (ref)		
Female	0.858	0.576–1.280	.454	0.848	0.548–1.310	.457
<b>Race</b>						
White	1 (ref)			1 (ref)		
Non-White	1.11	0.636–1.938	.714	1.491	0.778–2.858	.229
<b>Ethnicity</b>						
Non-Hispanic	1 (ref)			1 (ref)		
Hispanic	0.59	0.179–1.949	.387	0.519	0.151–1.783	.298
<b>Primary language</b>						
English	1 (ref)			1 (ref)		
Non-English	0.663	0.299–1.471	.312	0.671	0.276–1.631	.378
<b>Marital status</b>						
Married	1 (ref)			1 (ref)		
Single/partner/significant other	1.346	0.816–2.220	.245	1.533	0.890–2.638	.123
Separated/divorced/widowed	0.848	0.509–1.414	.528	0.935	0.537–1.630	.813
<b>Insurance status</b>						
Private	1 (ref)			1 (ref)		
Public (Medicare/Medicaid)	1.196	0.804–1.778	.377	1.363	0.831–2.233	.22
<b>Occupation</b>						
Employed	1 (ref)			1 (ref)		
Retired/unemployed	0.918	0.593–1.420	.7	0.912	0.558–1.490	.712
<b>Median income</b>						
≥84,308	1 (ref)			1 (ref)		
58,115–84,307	1.578	0.879–2.835	.127	1.621	0.753–3.490	.217
38,938–58,114	0.995	0.578–1.714	.987	1.018	0.294–3.528	.978
≤38,937	0.928	0.544–1.584	.785	0.862	0.215–3.452	.834
<b>Distance to facility (miles)</b>						
≤1.64	1 (ref)			1 (ref)		
1.65–3.56	1.393	0.767–2.529	.276	1.451	0.764–2.759	.256

TABLE 2 (Continued)

	A. UVA model			B. MVA model		
	OR	95% CI	p	aOR	95% CI	p
3.57–10.49	1.147	0.659–1.997	.627	1.308	0.647–2.646	.454
≥10.50	0.653	0.390–1.094	.106	0.71	0.355–1.423	.335
<b>Education (% with at least a bachelor's degree)</b>						
≥82%	1 (ref)			1 (ref)		
65%–81%	1.423	0.797–2.543	.233	1.128	0.523–2.435	.758
42%–64%	0.933	0.540–1.613	.804	1.107	0.296–4.141	.88
≤41%	0.899	0.521–1.549	.7	1.124	0.262–4.819	.875
<b>Dysphagia severity</b>						
Mild	1 (ref)			1 (ref)		
Mild to moderate	1.137	0.759–1.701	.534	1.167	0.763–1.787	.476
Severe	0.44	0.139–1.387	.161	0.369	0.107–1.270	.114
<b>Attendance year</b>						
2016–2019	1 (ref)			1 (ref)		
2021–2023	1.097	0.722–1.666	.665	1.136	0.732–1.764	.569

Note: p value from Wald test for H0: OR = 1 (same risk in both groups).

Abbreviations: aOR, adjusted odds ratio; OR, odds ratio; OR (95% CI), hazard ratio and corresponding 95% confidence interval.

## 2.5 | Statistical analyses

Continuous variables were presented as mean ± standard deviation (SD) or median ± interquartile range (IQR). Categorical variables were compared using Pearson chi-square tests and Fisher's exact tests when appropriate. Univariable (odds ratio [OR]) and multivariable (adjusted odds ratio [aOR]) binary logistic regression models were employed to identify factors associated with successful adherence. Descriptive statistics and logistic regression analyses were performed using IBM SPSS Statistics version 28.0.0 (Armonk, NY), with statistical significance defined as  $p < .05$ . Data were analyzed from June 1, 2023, to October 6, 2023.

## 3 | RESULTS

### 3.1 | Patient demographics

Demographic and clinical characteristics of the cohort are outlined in Table 1. During the study period, 600 OD patients attended at least one swallowing therapy session, with approximately 79% adhering to ≥50% of the recommended sessions.

The mean age of the cohort was  $70.2 \pm 13.7$  years. Most patients in the cohort were male (60.8%), English-speaking (94.7%), married (57.8%), White (84.7%), non-Hispanic (97.8%), retired or unemployed (70.8%), publicly insured (59%), diagnosed with mild dysphagia (53.3%), and older than 65 years (73.5%). The median distance from their residence to our voice center is 3.56 miles (9). The median income of the cohort based on census zip code was \$58,198 (\$46,930).

On chi-square analysis, there was no statistically significant associations between adherence (<50% and ≥50%) and age ( $p = .973$ ), sex ( $p = .454$ ), race ( $p = .713$ ), ethnicity ( $p = .382$ ), primary language ( $p = .309$ ), marital status ( $p = .319$ ), insurance status ( $p = .376$ ), occupational status ( $p = .700$ ), median income ( $p = .284$ ), distance ( $p = .050$ ), education ( $p = .392$ ), OD severity ( $p = .244$ ), and diagnosis year ( $p = .665$ ).

On univariable and multivariable analysis, we found no covariables to be significant predictors of poor adherence to swallow therapy ( $p > .05$ ) (Table 2).

## 4 | DISCUSSION

In the field of laryngology, disparities in treatment adherence have been previously studied for voice disorders and laryngeal cancer.<sup>13</sup> However, similar research on dysphagia patients is limited and often involves small sample sizes, focuses on study outcomes such as percutaneous endoscopic gastrostomy (PEG) placement, or based on self-reporting survey data.<sup>8,10</sup>

In this study, we examined the association between patient demographics and social determinants of health with OD treatment adherence. We hypothesized that several of these factors would be predictive of swallowing treatment adherence, however, we found no significant associations. This is in accordance with some previous studies on predictors of voice therapy adherence.<sup>14,16,17</sup> We observed that 21% of the cohort did not adhere to ≥50% of recommended sessions. This is a lower nonadherence rate than those observed among dysphonia patients (47%–65%).<sup>17,18</sup> To the best of our knowledge, this is the first report of such analyses in patients with clinically confirmed OD.

Previous research has shown that women were more likely to report having dysphagia,<sup>8,10</sup> but had a lower odds of receiving treatment.<sup>9,10</sup> In our current study, we found no significant association between gender and swallowing therapy adherence. In general, the impact of how gender roles affect treatment adherence is also conflicting. In general, some studies show women to be less adherent to recommended treatment plans or regimens compared to men<sup>19,20</sup>; others studies have found no significant association.<sup>21</sup> In the context of other laryngology disorders, such as dysphonia, similar discrepancies exist, with some studies showing no gender association with voice therapy completion or dropout,<sup>17,18</sup> and other studies generally show that men are less likely than women to report receiving treatments, therapy, or other rehabilitation services for their voice problem.<sup>22</sup>

Several studies have shown that minority patients are more likely to require a PEG following a stroke due to swallowing dysfunction.<sup>23-25</sup> Compared to Whites, Zheng et al. found that Blacks and Hispanics had a lower odds of endorsing symptoms of dysphagia but a higher odds of seeking treatment for the condition.<sup>10</sup> One possible explanation by the author for this finding could be that minorities seek treatment for dysphagia when the symptoms become advanced, at which point they are more likely to require treatment. Adkins et al. interestingly did not observe this finding and found that race was not associated with seeking swallowing treatment.<sup>9</sup> Our study found no significant associations between race, ethnicity, and adherence to swallowing treatment. Among dysphonia patients, studies found that non-White patients had a higher no-show rate for voice therapy compared to Whites.<sup>14</sup> Another study found Hispanics were less adherent to voice therapy for benign vocal cord nodules than non-Hispanics.<sup>26</sup> Further investigation is needed to understand the reasons behind these contrasting findings and to address potential barriers to care in patients with dysphagia, especially considering their significant health implications.

Our study found no significant association between insurance status and swallowing therapy adherence. Zheng et al. found that patients with public insurance had a higher odds of reporting symptoms of dysphagia, but a lower odds of seeking treatment.<sup>10</sup> A previous study has shown that publicly insured patients are less likely to seek treatment for dysphagia due to cost and lack of transportation.<sup>10</sup> Previous studies on dysphonia showed that lack of insurance was a common reason for not attending voice therapy.<sup>18</sup> Lim et al. found that those with private insurance were more likely to adhere to voice therapy compared to those with public insurance.<sup>27</sup> It is worth noting that our study did not include patients without insurance considering providers at our outpatient voice center did not see uninsured patients; this ultimately limited our insight into their adherence patterns. Further investigation is needed to understand the impact of noninsurance or public insurance (Medicare or Medicaid) status on swallowing therapy adherence in a broader population.

Our study found no association between patients' median income, education level, occupation status, and distance to the facility with swallowing treatment adherence. However, the literature has generally shown that low-income, low-educated adults, as well as those traveling

greater distances face barriers to health care, including transportation to appointments and missing work. Interestingly, in our study, many residents of the Tri-State area rely on the robust public transportation system in New York City, potentially mitigating the impact of distance on treatment adherence. Lower education, low income, and low SES are known risk factors for low health literacy,<sup>28</sup> which may affect patient's ability to seek and understand the importance of adherence to swallowing treatment. Zheng et al. found that educational level was not associated with reporting swallowing problems, but patients with lower educational status had a lower odd of seeking dysphagia treatment. Patients with lower income or unemployed status had higher odds of having dysphagia symptoms, but less odds of seeking treatment.<sup>10</sup> These findings highlight the importance of conducting future studies on the impact of health literacy and socioeconomic factors on treatment adherence in dysphagia patients.<sup>29</sup>

This retrospective study has limitations. Considering the retrospective nature of this investigation, the accuracy and consistency of the collected patient data may be subject to bias. This was a single-institution study, as such, our findings may not be generalizable to the general population. Our study population was predominantly White, non-Hispanic, and English speaking, which contrasts with the demographic makeup of New York City. We lacked sufficient power to detect associations with all our chosen factors. As such, investigating these factors in a larger, more diverse cohort of OD patients across various clinical settings may yield different results.

Another potential criticism of this study is our use of zip code as a proxy for certain SES factors such as income and education. SES variables may significantly vary a zip code boundary.<sup>30</sup> Our study would have benefited from using smaller geographic units, such as census tracts or census groups, however, this was unattainable through chart review. Furthermore, our reliance on ZIP code as a proxy for median income may be flawed considering it may not accurately represent the income distribution within the specific age group relevant to the study.

As previously mentioned, past studies in laryngology have displayed a lack of consistent criteria when assessing treatment adherence. A scoping review of 19 studies on voice therapy adherence showed that investigators utilized distinct benchmarks to determine successful voice treatment adherence. This criteria included achieving personal goals, expressing satisfaction with vocal outcomes, attending at least one session, engaging in practice between sessions, and attendance to 50% or more of the treatment sessions.<sup>13</sup> In our study, we could have changed the outcome measure of adherence to include the full completion of swallow therapy as recommended, the proportion of attended sessions, the completion of dysphagia home treatment swallowing exercises between sessions, adjusted the cutoff for successful adherence, or considered both the completion of therapy and practice between sessions.<sup>13</sup> The scoping review by Rubino and Abbott highlights the potential impact of methodological choices on study outcomes and underscores the need for consistency and clarity in defining treatment adherence in future laryngology research.

Ultimately, our regression analyses did not identify any clinical or sociodemographic disparities associated with nonadherence with

swallow therapy. The absence of significant disparities in our study is reassuring and may reflect the trusting relationship between patients and the providers at our institution. Alternatively, it may be because untreated dysphagia has more severe consequences than untreated dysphonia and thus patients are more inclined to adhere to recommended treatment. However, it is also possible that our study was too homogenous and/or did not fully capture all relevant sociodemographic or clinical factors influencing swallow therapy adherence. Factors such as the specific etiology of dysphagia, uninsured status, comorbidity burden, and the type of physician providing the referral (i.e., laryngologist vs. outside provider) were not examined in this study and may significantly impact adherence to swallow treatment.

In this retrospective study, we could not explore the attitudes among OD patients with lower adherence to swallow treatment. Future research should aim to conduct a prospective longitudinal study that can better assess why some patients stopped attending treatments or felt satisfied with their outcomes despite attending fewer than the recommended sessions. A future study that provides a more comprehensive understanding of the variables affecting swallow therapy adherence and thoroughly explores the nuances of patient adherence to swallow therapy will ultimately help improve outcomes for patients with OD, given the potential clinical consequences of the condition.

## 5 | CONCLUSION

Our study found no factors to be significantly associated with nonadherence to OD therapy. While no specific factors analyzed in our study reliably predicted therapy attendance, our study addresses an important knowledge gap and future studies would benefit at exploring other socioeconomic and disease-related factors within a more heterogeneous patient population.

## CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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**How to cite this article:** Ezeh UC, Balou M, Crosby T, Kwak PE, Amin MR. Factors associated with adherence to swallowing therapy among patients diagnosed with oropharyngeal dysphagia. *Laryngoscope Investigative Otolaryngology.* 2024;9(5):e1318. doi:[10.1002/lio2.1318](https://doi.org/10.1002/lio2.1318)