Parkinson's Disease-Associated versus Non-Neurogenic Dysphagia: A Comparative Analysis of Swallowing Interventions, Gastrostomy Placement, and Pneumonia

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Introduction

- Dysphagia, or difficulty swallowing, affects over 15 million Americans and is particularly prevalent among older adults and individuals with neurologic diseases.[1–3]
- Parkinson's disease (PD) is among the leading neurological causes of dysphagia. Estimates of the prevalence of dysphagia in PD range from 11% to 81%.[4-6]
- Aspiration pneumonia is a leading cause of mortality in this population.[6,7]
- Standard treatments for PD, such as dopaminergic medications and deep brain stimulation, confer little benefit in swallowing function.
- Targeted dysphagia interventions center around improving dietary intake, nutritional status, and overall quality of life and have shown utility.[4,8]
- Non-neurogenic dysphagia encompasses numerous structural and functional etiologies, including esophageal sphincter achalasia, esophageal strictures, esophageal dysmotility, oropharyngeal malignancy, gastroesophageal reflux, and muscle tension dysphagia.
- This study compares the rates of swallowing evaluations, therapeutic interventions, and complications between individuals with PD-associated dysphagia versus non-neurogenic etiologies.

Methods

Data source: All of Us Research Program (NIH), Version 7 Controlled Tier.
Population: >413,000 participants; EHR data available for ~287,000.
IRB: Exempt (University of Arizona IRB).
Inclusion criteria:
- Parkinson's disease (PD) or secondary parkinsonism with comorbid dysphagia.
- Comparison group: dysphagia without neurogenic cause.

Exclusions: Dysphagia due to neurogenic etiologies (PD, secondary parkinsonism, Alzheimer's, Huntington's, dementia, PSP, SCA, ALS, TBI, CVA).
Case identification: ICD-9/10 codes.
Outcomes:
- Swallow evaluation and therapy.
- Pneumonia and gastrostomy after dysphagia diagnosis.
- Identified by CPT codes.

Variables: Outcomes coded as binary categorical.
Analysis: Chi-square tests to compare PD vs non-neurogenic dysphagia; sub-analysis of therapy vs no therapy.
Significance: $p < 0.05$.

Results

Cohort:
- PD group: 2,112 individuals with PD; 699 (33.1%) had comorbid dysphagia.
  - Age: 16.7% (18–64), 83.3% (65+).
  - Sex: 58.0% male, 42.0% female.
- Non-neurogenic dysphagia: 19,279 individuals.
  - Age: 12.0% (18–44), 34.7% (45–64), 53.2% (65+).
  - Sex: 33.4% male, 66.6% female.

Swallow evaluation:
- PD-associated: 50.8%
- Non-neurogenic: 32.2% ($p < 0.001$).

Swallow therapy:
- PD-associated: 13.3%
- Non-neurogenic: 4.4% ($p < 0.001$).

Complications:
- Gastrostomy: 3.6% (PD) vs 2.5% (non-neurogenic), $p = 0.09$.
- Pneumonia: 21.3% (PD) vs 15.2% (non-neurogenic), $p < 0.001$.

Swallow therapy subgroup (PD-associated):
- Older age: 87.1% ≥65 vs 82.7% without therapy ($p < 0.001$).
- Male: 76.3% vs 55.1% ($p < 0.001$).
- Pneumonia: 35.5% vs 19.1% ($p < 0.001$).
- Gastrostomy: no significant difference ($p = 0.7$).

Swallow therapy subgroup (non-neurogenic):
- Older age: 65.3% ≥65 vs 52.7% without therapy ($p < 0.001$).
- Male: 56.7% vs 32.3% ($p < 0.001$).
- Gastrostomy: 9.4% vs 2.2% ($p < 0.001$).
- Pneumonia: 34.6% vs 14.4% ($p < 0.001$).

Results Cont.

Table 1. Intervention and complication rates for individuals with Parkinson's disease-associated dysphagia versus non-neurogenic dysphagia.

Outcome	Parkinson's disease dysphagia (n = 699)	Non-neurogenic dysphagia (n = 19,279)	Chi-square test p-value
Swallow evaluation	355 (50.8%)	6,213 (32.2%)	<0.001
Swallow therapy	93 (13.3%)	839 (4.4%)	<0.001
Gastrostomy placement	25 (3.6%)	490 (2.5%)	0.09
Pneumonia	149 (21.3%)	2,939 (15.2%)	<0.001

Table 2. Characteristics of individuals with Parkinson's disease-associated dysphagia and non-neurogenic dysphagia who received versus did not receive swallow therapy.

Group	Parkinson's disease dysphagia (n = 699)			Non-neurogenic dysphagia (n = 19,279)		
Characteristics	Swallow therapy (n = 93)	No swallow therapy (n = 606)	p-value	Swallow therapy (n = 839)	No swallow therapy (n = 18,440)	p-value
Age						
18 to 44	*	*	<0.001	56 (6.7%)	2,264 (12.3%)	<0.001
45 to 64	*	98 (16.2%)		235 (28.0%)	6,461 (35.0%)	
65 or older	81 (87.1%)	501 (82.7%)		548 (65.3%)	9,715 (52.7%)	
Sex at birth**						
Male	71 (76.3%)	321 (55.1%)	<0.001	468 (56.7%)	5,813 (32.3%)	<0.001
Female	22 (23.7%)	262 (44.9%)		358 (43.3%)	12,178 (67.7%)	
Gastrostomy	*	*	0.7	79 (9.4%)	411 (2.2%)	<0.001
Pneumonia	33 (35.5%)	116 (19.1%)	<0.001	290 (34.6%)	2,649 (14.4%)	<0.001

*NIH All of Us guidelines prohibit the disclosure of participant counts less than 20.
**Some participants did not disclose sex at birth. Percentages are of those who did.

Discussion

- PD-associated dysphagia patients had higher rates of swallow evaluation (50.8%) and therapy (13.3%) compared to non-neurogenic dysphagia.
- Despite increased utilization, nearly half of PD patients did not undergo evaluation and most did not receive therapy.
- Higher pneumonia incidence in PD-associated dysphagia (21.3% vs 15.2%), while gastrostomy rates were similar between groups.
- Increased pneumonia risk in PD likely reflects impaired sensation, reduced protective reflexes, and comorbid deficits in mobility and cognition.
- Male sex was strongly associated with higher swallow therapy utilization across both groups.
- Older age correlated with greater therapy use, consistent with more severe dysphagia in advanced disease.
- Pneumonia history predicted therapy utilization in PD-associated dysphagia; both pneumonia and gastrostomy predicted therapy in non-neurogenic dysphagia.
- Findings suggest swallow therapy is often applied reactively in more severe cases rather than as an early preventive measure.
- Emphasizes the potential benefit of incorporating routine swallow evaluation and earlier therapy into PD care.

Conclusions

- PD-associated dysphagia patients had higher swallow intervention rates but greater pneumonia risk.
- Older age, male sex, and prior pneumonia predicted swallow therapy utilization in PD.
- Enhanced monitoring and early, targeted interventions may improve outcomes in PD-associated dysphagia.

Abstract

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References:

1. Rommel N, Hamdy S. Oropharyngeal dysphagia: manifestations and diagnosis. Nat Rev Gastroenterol Hepatol. 2016;13(1):49-59. doi:10.1038/nrgastro.2015.199
2. Azer SA, Kanugula AK, Kshirsagar RK. Dysphagia. In: StatPearls. StatPearls Publishing; 2025. Accessed June 17, 2025. http://www.ncbi.nlm.nih.gov/books/NBK559174/
3. Rajati F, Ahmadi N, Naghibzadeh ZAS, Kazeminia M. The global prevalence of oropharyngeal dysphagia in different populations: a systematic review and meta-analysis. J Transl Med. 2022;20(1):175. doi:10.1186/s12967-022-03380-0
4. Takizawa C, Gemmell E, Kenworthy J, Speyer R. A Systematic Review of the Prevalence of Oropharyngeal Dysphagia in Stroke, Parkinson's Disease, Alzheimer's Disease, Head Injury, and Pneumonia. Dysphagia. 2016;31(3):434-441. doi:10.1007/s00455-016-9695-9
5. Suttrup I, Warnecke T. [Dysphagia in Parkinson's Disease: Pathophysiology, Diagnosis and Therapy]. Fortschr Neurol Psychiatr. 2016;84 Suppl 1:S18-23. doi:10.1055/s-0042-107245
6. Hurtte E, Young J, Gyawali CP. Dysphagia. Prim Care. 2023;50(3):325-338. doi:10.1016/j.pop.2023.03.001
7. Lanspa MJ, Jones BE, Brown SM, Dean NC. Mortality, morbidity, and disease severity of patients with aspiration pneumonia. Journal of Hospital Medicine. 2013;8(2):83-90. doi:10.1002/jhm.1996
8. Yoon HY, Shim SS, Kim SJ, et al. Long-Term Mortality and Prognostic Factors in Aspiration Pneumonia. Journal of the American Medical Directors Association. 2019;20(9):1098-1104.e4. doi:10.1016/j.jamda.2019.03.029