

Diagnostic accuracy of screening tests for detection of oropharyngeal aspiration and residue in Parkinson's Disease: a Diagnostic Accuracy Systematic Review



Andriani C.¹, Gandolfi S.¹, Walshe M.¹

1 Department of Clinical Speech and Language Studies, University of Dublin, Trinity College Dublin, Ireland.

Background

People with Parkinson’s disease (PD) frequently experience oropharyngeal dysphagia (OD), whose prevalence increases with age. The use of diagnostically accurate screening tests (STs) would enable prompt detection of aspiration and pharyngeal residue to reduce the occurrence of adverse consequences providing safer, higher quality and cost-effective care for people with PD and OD [1,2].

Aim

The aim of this study is to examine the diagnostic accuracy of dysphagia screening tests to detect aspiration and pharyngeal residue in people with PD.

Methods

Methodology	Systematic review → PRISMA-DTA [3] guidelines
Databases	Pubmed, CINAHL, Web of Science, Embase
Hand-search	Dysphagia Journal, International Journal of Speech - Language Pathology
Date	Inception - April 2024
Data analysis	RevMan software, version 5.4.1
Risk of bias	QUADAS-2
Metanalysis	Not conducted → data heterogeneity

Inclusion and analysis criteria:

- **Endpoint:** aspiration and pharyngeal residue,
- **Reference standards:** videofluoroscopy (VFSS) and fiberoptic examination of swallowing safety (FEES),
- **Population:** idiopathic PD, men and women, > 18 years old,
- **Psychometric estimates:** sensitivity (Se), specificity (Sp), negative and positive predictive values (NPV, PPV), positive and negative likelihood ratios (LHR), diagnostic odds ratios.

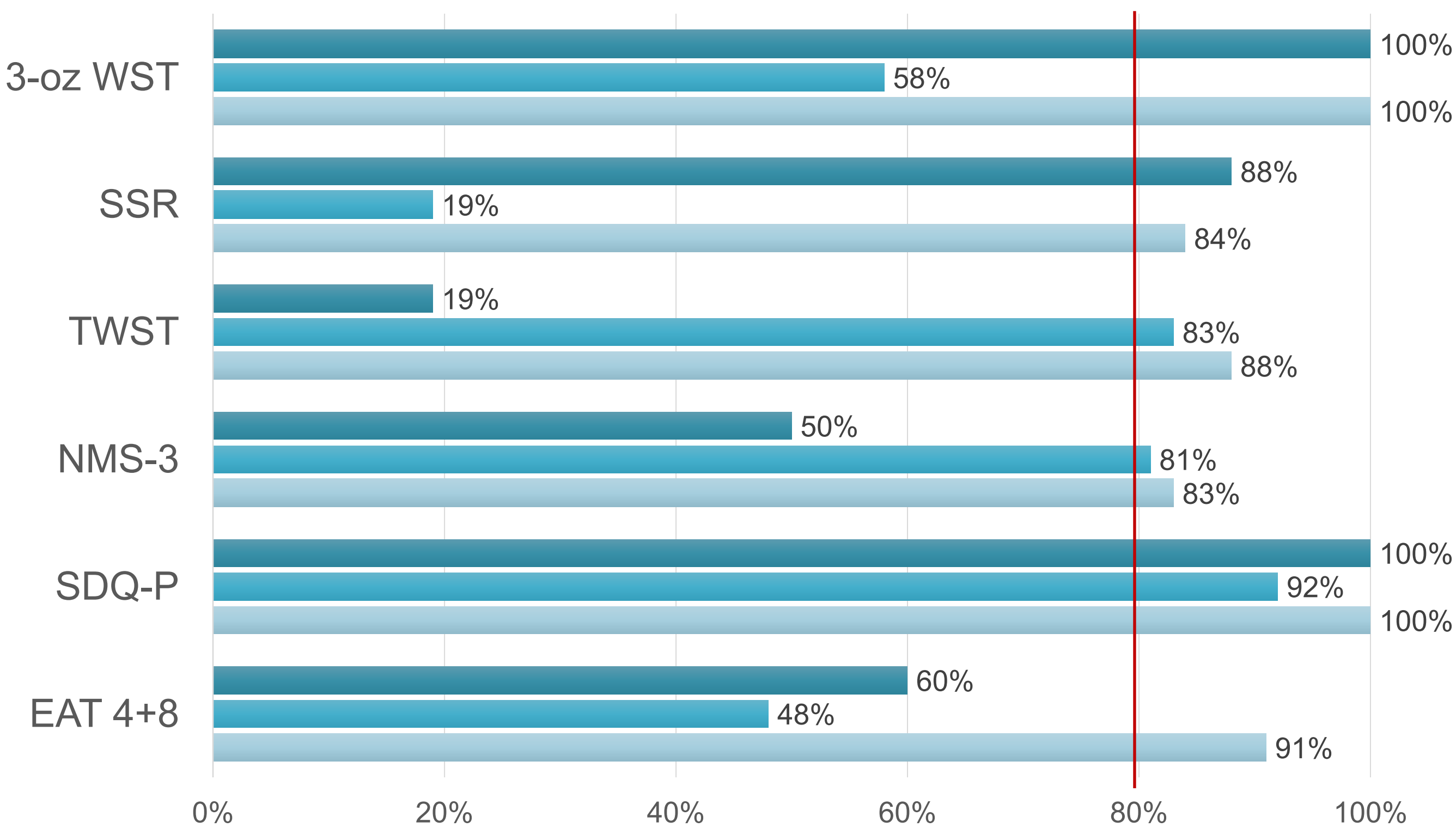
ASPIRATION	¹ Gugging Swallow Screen	GUSS
	Timed Water Swallow Test	TWST
	3-ounce Water Swallow Test	3 oz WST
	Speed swallowing rate	SSR
	² Eating Assessment Tool	EAT-10
RESIDUE	Swallowing Disturbance Questionnaire - Persian	SDQ-P
	Munich Dysphagia Test	MDT-PD
	Nonmotor Symptom questionnaire for PD question 3	NMS-3
	² AIMS-SDQ question 7	AIMS-SD q7
	EAT-10 questions 4 and 8	EAT 4+8

Table 1 Screening tests per endpoint, 1 : swallow trials STs; 2 : patient-reported outcome measures

Results

PATIENT-REPORTED OUTCOME MEASURES	SWALLOW TRIALS TESTS
 4 ASPIRATION 2 PHARYNGEAL RESIDUE	 4 ASPIRATION

437 references were retrieved. Eight studies met the inclusion criteria, 10 screening tests investigated aspiration and/or residue (Table 1). Psychometric estimates for each tool were extracted. 6 STs have higher values than the minimum threshold of acceptability in at least one of the estimates (Table 2). STs accuracy was deemed acceptable in case of a combination of at least 80% sensitivity and 70% specificity [4]. Concerns about RoB was generally “low”.



	3-oz WST	SSR	TSWT	NMS-3	SDQ-P	EAT 4+8
Sensitivity	100%	88%	19%	50%	100%	60%
Specificity	58%	19%	83%	81%	92%	48%
NPV	100%	84%	88%	83%	100%	91%
LHR+	2.40	1.09	1.13	2.62	12.25	1.15

Table 2 Main results for three water trial screening and three patient-reported outcome measures. 80% (red line) is the minimum threshold for Se, Sp, NPV, > 4-5 for LHR+.

Conclusions

None of the STs is ideal at detecting aspiration and residue. Psychometrically sound screening tests for OD and PD are needed. None of the questions analysed for pharyngeal residue detection are reliable but may be useful in suggesting aspiration or risk of aspiration. WSTs (3-oz WST and SSR) are effective in identifying aspirators among people with Parkinson's Disease, however, further clinical/instrumental assessment is still recommended.

References

1. Speyer, R., Cordier, R., Farneti, D., Nascimento, W., Pilz, W., Verin, E., Walshe, M., & Woisard, V. (2022). White Paper by the European Society for Swallowing Disorders: Screening and Non-instrumental Assessment for Dysphagia in Adults. *Dysphagia*, 37(2), 333-349. <https://doi.org/10.1007/s00455-021-10283-7>

2. Brodsky, M. B., Suiter, D. M., Gonzalez-Fernandez, M., Michtalik, H. J., Frymark, T. B., Venediktov, R., & Schooling, T. (2016). Screening Accuracy for Aspiration Using Bedside Water Swallow Tests: A Systematic Review and Meta-Analysis. *Chest*, 150(1), 148-163. <https://doi.org/10.1016/j.chest.2016.03.059>

3. Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group*. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of internal medicine*, 151(4), 264-269. <https://doi.org/10.1371%2Fjournal.pmed.1000097>

4. Pflug, C., Niessen, A., Buhmann, C., & Bihler, M. (2019). Swallowing speed is no adequate predictor of aspiration in Parkinson's disease. *Neurogastroenterol Motil*, 31(12), e13713. <https://doi.org/10.1111/nmo.13713>

Contact
email: andrianc@tcd.ie