Supplementary Material

Dysphagia in Alzheimer's Disease: Prevalence, Swallowing Phenotype, Airway Safety, and Associations With Disease Severity: A Systematic Review and Meta-Analysis

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Table S1. Information sources and database-specific search strategies

All databases were searched from inception without date or language limits; eligibility (English or Turkish, peer-reviewed, full text available) was applied at screening. Search dates are reported for each source, and the total number of records retrieved from all databases is given.

Source	Platform / interface	Last search / records
PubMed/MEDLINE	PubMed (National Library of Medicine)	**01.07.2026-01.08.2026**
Embase	Embase.com (Elsevier)	**01.07.2026-01.08.2026**
Scopus	Scopus (Elsevier)	**01.07.2026-01.08.2026**
Web of Science Core Collection	Web of Science (Clarivate)	**01.07.2026-01.08.2026**
Cochrane Library (CENTRAL)	Cochrane Library (Wiley)	**01.07.2026-01.08.2026**

Source	Platform / interface	Last search / records
APA PsycINFO	EBSCOhost (referred to as 'EBSCO' in the submitted version)	**01.07.2026-01.08.2026**
Total database records (after export, before de-duplication)		738
Citation searching (reference lists of included studies and relevant reviews; forward citation tracking)	—	9

Note: all databases were last searched on **1 August 2026 (searches were run between 1 July and 1 August 2026)**, without date or language limits.

Table S2. Deviations from the registered protocol (PROSPERO CRD420261480514)

Item	Registered protocol	What was done	Reason
Risk-of-bias appraisal	Design-specific JBI critical appraisal checklists	Item judgements were recorded on a harmonized nine-domain framework derived from the JBI checklists (Table S5); an explicit rule for the overall rating was defined during revision	Allows one comparable matrix across designs; overall categories were previously judgement-based
Proportion meta-analysis	Random-effects model with Freeman–Tukey transformation	Unchanged as primary model; back-transformation specified (Miller's inverse with harmonic mean); binomial–normal GLMM and logit-REML sensitivity analyses and 95% prediction intervals added during revision	Reviewer request; known limitations of the Freeman–Tukey back-transformation
Phenotype-specific outcomes (oral/pharyngeal phase, silent aspiration, swallowing apraxia)	Pooled prevalence where ≥2 comparable studies	Synthesized narratively (Table 4 of the main text)	Definitions, protocols and metrics were not comparable; no included study reported silent aspiration or swallowing apraxia quantitatively
Certainty of evidence	GRADE	GRADE applied with the framework for event rates/prevalence (Iorio et al. [35]) and standard GRADE for the severity association; results now reported (Table 6)	Results were not reported in the submitted version
Data for Parlak et al. 2022 [10]	—	Re-extracted from the published report during revision (n=35; FEES performed in all participants)	Extraction error identified during the data audit requested by the reviewers
Severity data for Oliveira et al. 2026 [32]	—	Corrected to 7/36 (moderate/severe) vs 0/18 (mild), as in Table 3 of the source; one participant lacked CDR data	Denominator previously entered as the number of non-events
Rösler et al. 2015 [48]	Included	Excluded at revision (mixed dementia; 24 of 161 participants had AD, but results by dementia type were not reported)	Did not meet the prespecified criterion that AD-specific data be extractable
Penetration and/or aspiration analysis	—	Tanrıverdi et al. 2025 [27] (PAS ≥2 on FEES, 31/32) added	Eligible data with the same definition (PAS ≥2) identified during the audit
Exploration of heterogeneity (overall dysphagia)	—	Stage-stratified pooled proportions, univariable meta-regression (stage composition, sample size, publication year; Knapp–Hartung adjustment), and additional subgroup (risk of bias, inclusion of severe/advanced disease, sample size) and sensitivity analyses	Reviewer request in the second round of peer review; residual heterogeneity remained extreme within the assessment-method subgroups

Item	Registered protocol	What was done	Reason
		(excluding the questionnaire-based study and the study defining dysphagia as PAS >1) were added (Table 3 of the main text)	
Eligibility of Horner et al. 1994 [3] (self-described prospective case series)	Case series excluded	Definition clarified: descriptive reports of selected individual patients were excluded; a prospective series in which all enrolled participants underwent standardized videofluoroscopy was treated as a single-group observational study and retained; sensitivity analyses excluding this study were added (overall 43%, 95% CI 22–65%; aspiration 5%, 95% CI 1–11%)	Reviewer request to make eligibility consistent with study classification
GRADE rating for the severity association	GRADE	Upgrade for a large magnitude of association removed; certainty changed from low to very low; pooled risk ratio added (RR 2.28, 95% CI 1.40–3.73)	ORs were unadjusted, plausible confounding could not be excluded, and the large-effect criterion was not met on the risk-ratio scale
Definition of overall dysphagia	Overall dysphagia as defined by each study	Sensitivity analysis excluding the two studies whose primary definition was penetration and/or aspiration (42%, 95% CI 21–64%)	Reviewer request to distinguish overall swallowing dysfunction from PAS-defined airway invasion
Overall risk-of-bias rating	Design-specific JBI checklists (first revision: percentage of applicable domains rated Yes)	Percentage rule replaced by a critical-domain rule (Q3, Q5, Q7); follow-up (Q8) rated Not applicable for cross-sectional studies and case series, as specified in Table S5; design labels of Horner et al. [3] (case series) and Sato et al. [18] (cross-sectional) made consistent with Table 1. Ratings of the 11 prevalence studies and the low-risk sensitivity analysis were unchanged	Reviewer requests to avoid a percentage-based score, to account for critical concerns, and to rate non-applicable items as Not applicable

Table S3. Study-level extraction for every meta-analytic estimate

NR = not reported in the original publication. Event counts and denominators are those analysed.

Study	Analysis	Outcome definition (as used)	Assessment method	Sample / group	Events	N	Source in report	Notes
Horner et al., 1994 [3]	Overall prevalence	Abnormal oropharyngeal swallowing on VFSS (all but 4 participants)	VFSS	Whole AD sample; subgroup: Instrumental	21	25	Abstract	
Sato et al., 2014 [18]	Overall prevalence	Abnormal MWST (cut-off as defined by the original authors)	Modified Water Swallowing Test (MWST)	Whole AD sample; subgroup: Clinical	37	155	Full text	
Seçil et al., 2016 [2]	Overall prevalence	Abnormal dysphagia limit (cut-off as defined by the original authors)	Dysphagia limit / 50-mL sequential water swallowing with submental EMG	Whole AD sample; subgroup: Clinical	30	40	Full text	
Takagi et al., 2017 [9]	Overall prevalence	Poor swallowing function on MWST + cervical auscultation (cut-off as defined by the original authors)	MWST with cervical auscultation	Whole AD sample; subgroup: Clinical	17	232	Full text	
Özsürekci et al., 2020 [23]	Overall prevalence	Dysphagia on VFSS (penetration and/or aspiration; same 24	VFSS (PAS)	Whole AD sample; subgroup: Instrumental	24	76	Full text	

Study	Analysis	Outcome definition (as used)	Assessment method	Sample / group	Events	N	Source in report	Notes
		participants) (as defined by the original authors)						
Simões et al., 2020 [24]	Overall prevalence	MWST score ≤3	MWST	Whole AD sample; subgroup: Clinical	97	145	Tables 1–2	
Parlak et al., 2022 [10]	Overall prevalence	BWST score ≥3 of 6 ('difficulty in swallowing')	Bedside water swallow test (BWST)	Whole AD sample; subgroup: Clinical	7	35	Results; Tables 2 and 4	Re-extracted from published report (35 AD; FEES in all)
Güner et al., 2023 [11]	Overall prevalence	EAT-10 ≥3; cognitively intact controls excluded	EAT-10	Whole AD sample; subgroup: Questionnaire/screening	50	66	Results	
Tanrıverdi et al., 2025 [27]	Overall prevalence	Any PAS score >1 on FEES	FEES (PAS)	Whole AD sample; subgroup: Instrumental	31	32	Abstract	
Arslan-Sarımehmetoğlu & Bazancir-Apaydin, 2025 [30]	Overall prevalence	'Functional dysphagia' as defined by the authors (as defined by the original authors)	Water swallow tests (10-mL/100-mL), RSST, EAT-10	Whole AD sample; subgroup: Clinical	6	25	Full text	
Oliveira et al., 2026 [32]	Overall prevalence	DOSS levels 1–5 (dysphagia) vs 6–7	VFSS (DOSS)	Whole AD sample; subgroup: Instrumental	7	55	Tables 1 and 3	
Sato et al., 2014 [18]	Severity (OR)	Abnormal MWST (cut-off as defined by the original authors)	Modified Water Swallowing Test (MWST)	Less advanced: Mild/moderate AD (12/94) More advanced: Severe AD (25/61)	25; 12	61; 94	Full text	
Seçil et al., 2016 [2]	Severity (OR)	Abnormal dysphagia limit (cut-off as defined by the original authors)	Dysphagia limit / 50-mL sequential water swallowing with submental EMG	Less advanced: Mild (5/11) More advanced: Moderate + severe (25/29)	25; 5	29; 11	Full text	
Takagi et al., 2017 [9]	Severity (OR)	Poor swallowing function on MWST + cervical auscultation (cut-off as defined by the original authors)	MWST with cervical auscultation	Less advanced: CDR 0.5–1 (4/106) More advanced: CDR 2–3 (13/126)	13; 4	126; 106	Full text	
Özsürekci et al., 2020 [23]	Severity (OR)	Dysphagia on VFSS (penetration and/or aspiration; same 24 participants) (as defined by the original authors)	VFSS (PAS)	Less advanced: CDR 1 (8/26) More advanced: CDR 2–3 (16/50)	16; 8	50; 26	Full text	
Simões et al., 2020 [24]	Severity (OR)	MWST score ≤3	MWST	Less advanced: Mild/moderate AD (8/48) More advanced: Severe AD (89/97)	89; 8	97; 48	Tables 1–2	
Güner et al., 2023 [11]	Severity (OR)	EAT-10 ≥3; cognitively intact controls excluded	EAT-10	Less advanced: Mild AD (23/36) More advanced: Moderate AD (27/30)	27; 23	30; 36	Results	
Oliveira et al., 2026 [32]	Severity (OR)	DOSS levels 1–5 (dysphagia) vs 6–7	VFSS (DOSS)	Less advanced: Mild (CDR 1) (0/18)	7; 0	36; 18	Tables 1 and 3	Zero cell: 0.5 added to all four cells; CDR missing for 1 participant (54 analysed)

Study	Analysis	Outcome definition (as used)	Assessment method	Sample / group	Events	N	Source in report	Notes
				More advanced: Moderate/severe (CDR 2–3) (7/36)				
Horner et al., 1994 [3]	Aspiration	Aspiration on VFSS	VFSS	Whole instrumentally assessed AD sample	6	25	Abstract	
Suh et al., 2009 [17]	Aspiration	Aspiration on VFSS (as reported)	VFSS	Whole instrumentally assessed AD sample	2	15	Full text	
Parlak et al., 2022 [10]	Aspiration	Aspiration on FEES	FEES	Whole instrumentally assessed AD sample	1	35	Results; Tables 2 and 4	
Oliveira et al., 2026 [32]	Aspiration	Aspiration, PAS 6–8 (VFSS)	VFSS	Whole instrumentally assessed AD sample	3	55	Tables 1 and 3	
Suh et al., 2009 [17]	Penetration	Laryngeal penetration on VFSS (as reported)	VFSS	Whole instrumentally assessed AD sample	11	15	Full text	
Parlak et al., 2022 [10]	Penetration	Penetration on FEES	FEES	Whole instrumentally assessed AD sample	9	35	Results; Tables 2 and 4	
Oliveira et al., 2026 [32]	Penetration	Penetration, PAS 2–5 (VFSS)	VFSS	Whole instrumentally assessed AD sample	3	55	Tables 1 and 3	
Özsürekci et al., 2020 [23]	Penetration and/or aspiration	Penetration and/or aspiration on VFSS	VFSS	Whole AD sample	24	76	Full text	Same 24 participants as the overall-dysphagia count
Tanrıverdi et al., 2025 [27]	Penetration and/or aspiration	PAS ≥2 (FEES)	FEES	Whole AD sample	31	32	Abstract	Added during revision
Oliveira et al., 2026 [32]	Penetration and/or aspiration	PAS ≥2 (VFSS)	VFSS	Whole AD sample	6	55	Tables 1 and 3	

No additional data were obtained from study authors; all estimates are based on data reported in the published articles.

Table S4. Harmonization of Alzheimer's disease stage for the severity comparison

Rule: 'less advanced' = the mildest stage group(s) for which the original study reported dysphagia counts; 'more advanced' = all higher stages combined. Where the original study reported only two combined groups, that grouping was retained (so moderate AD fell in the less advanced group in Sato et al. [18] and Simões et al. [24] and in the more advanced group elsewhere). Odds ratios are unadjusted and computed from the reported counts; each study contributes one independent comparison.

Study	Staging system	Less advanced (events/N)	More advanced (events/N)	OR (95% CI)	Rationale
Sato et al., 2014 [18]	Clinical stage as reported (mild/moderate vs severe)	Mild/moderate AD: 12/94	Severe AD: 25/61	4.75 (2.15–10.48)	Original two-group reporting retained
Seçil et al., 2016 [2]	Clinical stage as reported (mild, moderate, severe)	Mild: 5/11	Moderate + severe: 25/29	7.50 (1.53–36.71)	Intermediate stage combined with severe
Takagi et al., 2017 [9]	CDR	CDR 0.5–1: 4/106	CDR 2–3: 13/126	2.93 (0.93–9.29)	Intermediate stage combined with severe

Study	Staging system	Less advanced (events/N)	More advanced (events/N)	OR (95% CI)	Rationale
Özsürekci et al., 2020 [23]	CDR	CDR 1: 8/26	CDR 2–3: 16/50	1.06 (0.38–2.95)	Intermediate stage combined with severe
Simões et al., 2020 [24]	CDR (mild/moderate vs severe)	Mild/moderate AD: 8/48	Severe AD: 89/97	55.62 (19.49–158.73)	Original two-group reporting retained
Güner et al., 2023 [11]	CDR (1 vs 2)	Mild AD: 23/36	Moderate AD: 27/30	5.09 (1.29–20.08)	Original two-group reporting retained
Oliveira et al., 2026 [32]	CDR	Mild (CDR 1): 0/18	Moderate/severe (CDR 2–3): 7/36	9.41 (0.51–174.61)	Intermediate stage combined with severe
Parlak et al., 2022 [10] (sensitivity analysis only)	CDR (1, 2, 3)	Mild: 0/12	Intermediate + advanced: 7/23	—	Counts derived from published percentages (advanced 45.5% of 11; intermediate 16.7% of 12; overall 20% of 35)

Table S5. Risk-of-bias domains (Q1–Q9), mapping to the design-specific JBI checklists, and decision rule

Item numbers refer to the JBI critical appraisal checklists for analytical cross-sectional studies (CS, 8 items), cohort studies (CO, 11 items), case–control studies (CC, 10 items), quasi-experimental studies (QE, 9 items) and randomized controlled trials (RCT, 13 items) (JBI Manual for Evidence Synthesis, 2020).

Domain	Definition	Cross-sectional	Cohort	Case–control	Quasi-experimental	RCT
Q1	Sample clearly defined and selected appropriately	CS1, CS2	CO1	CC1, CC2, CC3	QE2	RCT1–RCT3
Q2	Inclusion criteria clearly specified	CS1	CO1	CC3	QE2	RCT3
Q3	AD diagnosis established with valid, reliable criteria	CS3, CS4	CO2, CO3	CC4, CC5	—	—
Q4	Exposure/clinical characteristics (e.g., disease stage) measured appropriately	CS3	CO2, CO3	CC4, CC5	QE1, QE3	RCT7
Q5	Swallowing function assessed with valid, reliable methods	CS4	CO7	CC8	QE8	RCT11
Q6	Confounding factors identified and, where appropriate, controlled	CS5, CS6	CO4, CO5	CC6, CC7	QE4	RCT1, RCT2
Q7	Outcomes measured validly, reliably and in the same way across groups	CS7	CO7	CC8	QE7, QE8	RCT10, RCT11 (RCT4–RCT6 blinding)
Q8	Follow-up adequate and complete (if applicable)	Not applicable	CO8–CO10	CC9	QE5, QE6	RCT8, RCT9
Q9	Appropriate statistical analysis	CS8	CO11	CC10	QE9	RCT12, RCT13

Response options: Yes, No, Unclear, Not applicable. Decision rule for the overall rating (critical-domain rule, revised in the second round of peer review): critical domains are Q3 (AD diagnosis), Q5 (swallowing assessment), and Q7 (outcome measurement); high risk of bias if any critical domain is rated No or two or more are Unclear; moderate if one critical domain is Unclear; low if all critical domains are Yes. 'Unclear' denotes insufficient reporting and 'No' a demonstrably inadequate method. Q8 is rated Not applicable for cross-sectional studies and case series. 'High' always denotes high risk of bias (i.e., lower methodological quality). Ratings informed the sensitivity analysis restricted to low-risk-of-bias studies and the GRADE risk-of-bias judgements.

Table S6. Reports excluded at full-text assessment (n = 8) and reports not retrieved (n = 4)

Reason	Number of reports
Mixed dementia population; Alzheimer-specific data not extractable (including Rösler et al. 2015 [48], excluded at revision)	6
Insufficient quantitative or methodological data for extraction	2
Full text not retrievable	4

Table S7. Sensitivity analyses and small-study-effect assessments

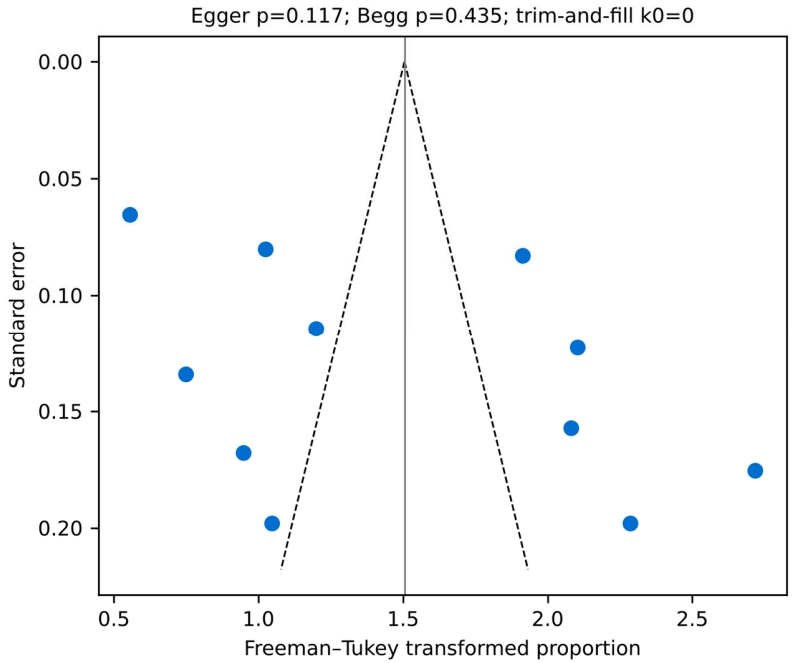
Outcome	Model / analysis	k	N	Pooled % (95% CI)	95% PI (%)	I^2 (%)
Overall dysphagia	Freeman–Tukey, REML (primary)	11	886	46.6 (25.9–68.0)	0.0–100.0	97.4
Overall dysphagia	Logit, REML	11	886	45.8 (23.8–69.5)	1.7–97.6	96.8
Overall dysphagia	Binomial–normal GLMM (ML)	11	886	46.6 (24.3–70.4)	1.7–97.7	—
Aspiration	Freeman–Tukey, REML (primary)	4	130	9.2 (1.9–19.9)	0.0–63.8	62.0
Aspiration	Logit, REML	4	130	10.1 (3.9–23.9)	0.2–87.0	58.9
Aspiration	Binomial–normal GLMM (ML)	4	130	8.9 (3.7–19.9)	0.3–77.3	—
Laryngeal penetration	Freeman–Tukey, REML (primary)	3	105	30.3 (1.1–73.4)	0.0–100.0	94.5
Laryngeal penetration	Logit, REML	3	105	27.5 (4.2–76.5)	0.0–100.0	92.6
Laryngeal penetration	Binomial–normal GLMM (ML)	3	105	26.8 (5.6–69.4)	0.0–100.0	—
Penetration and/or aspiration	Freeman–Tukey, REML (primary)	3	163	48.0 (2.1–96.5)	0.0–100.0	98.2
Penetration and/or aspiration	Logit, REML	3	163	51.7 (4.4–96.1)	0.0–100.0	97.2
Penetration and/or aspiration	Binomial–normal GLMM (ML)	3	163	53.2 (6.8–94.6)	0.0–100.0	—
Overall dysphagia	Low risk of bias only (Horner, Güner excluded)	9	795	39.1 (17.9–62.5)	0.0–100.0	97.6
Overall dysphagia	Leave-one-out (range of pooled estimates)	10	—	40.6 (omitting Tanrıverdi et al. [27]) to 51.6 (omitting Takagi et al. [9])	—	—

Severity analysis (more vs less advanced AD)	k	OR (95% CI)	95% PI	I^2 (%)
Primary (7 studies)	7	5.79 (2.12–15.81)	0.22–151.08	78.6
Excluding the zero-cell study (Oliveira et al. [32])	6	5.57 (1.87–16.56)	0.13–232.83	82.5
Adding Parlak et al. 2022 [10] (derived stage counts)	8	6.04 (2.36–15.47)	0.31–117.34	74.9
Excluding studies with moderate AD in the less advanced group (Sato, Simões)	5	3.15 (1.38–7.20)	0.31–31.76	40.8
Leave-one-out: omitting Sato et al., 2014 [18]	6	6.06 (1.81–20.28)	—	79.2
Leave-one-out: omitting Seçil et al., 2016 [2]	6	5.58 (1.75–17.82)	—	82.6
Leave-one-out: omitting Takagi et al., 2017 [9]	6	6.58 (2.06–21.02)	—	80.7
Leave-one-out: omitting Özsürekci et al., 2020 [23]	6	8.04 (3.06–21.17)	—	70.6
Leave-one-out: omitting Simões et al., 2020 [24]	6	3.45 (1.80–6.63)	—	37.8
Leave-one-out: omitting Güner et al., 2023 [11]	6	5.94 (1.83–19.28)	—	82.3

Severity analysis (more vs less advanced AD)	k	OR (95% CI)	95% PI	I^2 (%)
Leave-one-out: omitting Oliveira et al., 2026 [32]	6	5.57 (1.87–16.56)	—	82.5

Small-study effects (primary prevalence analysis, k=11; Freeman–Tukey scale): Egger regression intercept 8.04 (SE 4.64), p=0.117; Begg rank correlation Kendall's τ=0.18, p=0.435; trim-and-fill (L0 estimator, REML) imputed 0 studies, leaving the pooled estimate unchanged (46.6%, 95% CI 25.9–68.0%). These analyses are exploratory: with extreme heterogeneity and proportion data, funnel-plot asymmetry is an unreliable indicator of publication bias. Small-study effects were not assessed for analyses with fewer than 10 studies.

Figure S1. Funnel plot for the primary prevalence analysis



Freeman–Tukey transformed proportions plotted against their standard errors; dashed lines show pseudo-95% limits around the random-effects estimate.

File S1. Analysis dataset and code

S1.1 PubMed/MEDLINE (PubMed)

("Alzheimer Disease"[MeSH] OR "Alzheimer disease" OR "Alzheimer's disease" OR "Alzheimer dementia" OR "Alzheimer-type dementia" OR "dementia of the Alzheimer type" OR "AD") AND ("Deglutition Disorders"[MeSH] OR dysphagia OR "swallowing disorder*" OR "swallowing dysfunction*" OR "swallowing impairment*" OR "deglutition disorder*" OR "oropharyngeal

dysphagia" OR "oral dysphagia" OR "pharyngeal dysphagia" OR "oral phase" OR "oral-phase dysfunction" OR "pharyngeal phase" OR "pharyngeal-phase dysfunction" OR "oral transit" OR "pharyngeal transit" OR "swallowing apraxia" OR "delayed swallow*" OR "swallow initiation" OR "oral residue" OR "pharyngeal residue" OR penetration OR aspiration OR "silent aspiration" OR "laryngeal penetration")

Note: this is the strategy reported in the main text (Section 2.1); a misplaced quotation mark in the term "delayed swallow" in the submitted version has been corrected.*

S1.2 Embase (Embase.com)

('Alzheimer disease'/exp OR 'Alzheimer disease':ti,ab,kw OR 'Alzheimer''s disease':ti,ab,kw OR 'Alzheimer dementia':ti,ab,kw OR 'Alzheimer-type dementia':ti,ab,kw OR 'dementia of the Alzheimer type':ti,ab,kw OR alzheimer*:ti,ab,kw) AND ('dysphagia'/exp OR dysphagia:ti,ab,kw OR 'swallowing disorder*':ti,ab,kw OR 'swallowing dysfunction*':ti,ab,kw OR 'swallowing impairment*':ti,ab,kw OR 'deglutition disorder*':ti,ab,kw OR 'oropharyngeal dysphagia':ti,ab,kw OR 'oral dysphagia':ti,ab,kw OR 'pharyngeal dysphagia':ti,ab,kw OR 'oral phase':ti,ab,kw OR 'oral-phase dysfunction':ti,ab,kw OR 'pharyngeal phase':ti,ab,kw OR 'pharyngeal-phase dysfunction':ti,ab,kw OR 'oral transit':ti,ab,kw OR 'pharyngeal transit':ti,ab,kw OR 'swallowing apraxia':ti,ab,kw OR 'delayed swallow*':ti,ab,kw OR 'swallow initiation':ti,ab,kw OR 'oral residue':ti,ab,kw OR 'pharyngeal residue':ti,ab,kw OR penetration:ti,ab,kw OR aspiration:ti,ab,kw OR 'silent aspiration':ti,ab,kw OR 'laryngeal penetration':ti,ab,kw)

S1.3 Scopus

TITLE-ABS-KEY(("Alzheimer disease" OR "Alzheimer's disease" OR "Alzheimer dementia" OR "Alzheimer-type dementia" OR "dementia of the Alzheimer type" OR alzheimer*) AND (dysphagia OR "swallowing disorder*" OR "swallowing dysfunction*" OR "swallowing impairment*" OR "deglutition disorder*" OR "oropharyngeal dysphagia" OR "oral dysphagia" OR "pharyngeal dysphagia" OR "oral phase" OR "oral-phase dysfunction" OR "pharyngeal phase" OR "pharyngeal-phase dysfunction" OR "oral transit" OR "pharyngeal transit" OR "swallowing apraxia" OR "delayed swallow*" OR "swallow initiation" OR "oral residue" OR "pharyngeal residue" OR penetration OR aspiration OR "silent aspiration" OR "laryngeal penetration"))

S1.4 Web of Science Core Collection

TS=(("Alzheimer disease" OR "Alzheimer's disease" OR "Alzheimer dementia" OR "Alzheimer-type dementia" OR "dementia of the Alzheimer type" OR alzheimer*) AND (dysphagia OR "swallowing disorder*" OR "swallowing dysfunction*" OR "swallowing impairment*" OR "deglutition disorder*" OR "oropharyngeal dysphagia" OR "oral dysphagia" OR "pharyngeal dysphagia" OR "oral phase" OR "oral-phase dysfunction" OR "pharyngeal phase" OR "pharyngeal-phase dysfunction" OR "oral transit" OR "pharyngeal transit" OR "swallowing apraxia" OR "delayed swallow*" OR "swallow initiation" OR "oral residue" OR "pharyngeal residue" OR penetration OR aspiration OR "silent aspiration" OR "laryngeal penetration"))

S1.5 Cochrane Library

#1 MeSH descriptor: [Alzheimer Disease] explode all trees #2 ("Alzheimer disease" OR "Alzheimer's disease" OR "Alzheimer dementia" OR "Alzheimer-type dementia" OR "dementia of the Alzheimer type" OR alzheimer*):ti,ab,kw #3 #1 OR #2 #4 MeSH descriptor: [Deglutition Disorders] explode all trees #5 (dysphagia OR "swallowing disorder*" OR "swallowing dysfunction*" OR "swallowing impairment*" OR "deglutition disorder*" OR "oropharyngeal dysphagia" OR "oral dysphagia" OR "pharyngeal dysphagia" OR "oral phase" OR "oral-phase dysfunction" OR "pharyngeal phase" OR "pharyngeal-phase dysfunction" OR "oral transit" OR "pharyngeal transit" OR "swallowing apraxia" OR "delayed swallow*" OR "swallow initiation" OR "oral residue" OR "pharyngeal residue" OR penetration OR aspiration OR "silent aspiration" OR "laryngeal penetration"):ti,ab,kw #6 #4 OR #5 #7 #3 AND #6

S1.6 APA PsycINFO (EBSCOhost)

(TI ("Alzheimer disease" OR "Alzheimer's disease" OR "Alzheimer dementia" OR "Alzheimer-type dementia" OR "dementia of the Alzheimer type" OR alzheimer*) OR AB ("Alzheimer disease" OR "Alzheimer's disease" OR "Alzheimer dementia" OR "Alzheimer-type dementia" OR "dementia of the Alzheimer type" OR alzheimer*)) AND (TI (dysphagia OR "swallowing disorder*" OR "swallowing dysfunction*" OR "swallowing impairment*" OR "deglutition disorder*" OR "oropharyngeal dysphagia" OR "oral dysphagia" OR "pharyngeal dysphagia" OR "oral phase" OR

"pharyngeal phase" OR "oral transit" OR "pharyngeal transit" OR "swallowing apraxia" OR "delayed swallow*" OR "swallow initiation" OR "oral residue" OR "pharyngeal residue" OR penetration OR aspiration OR "silent aspiration" OR "laryngeal penetration") OR AB (dysphagia OR "swallowing disorder*" OR "swallowing dysfunction*" OR "swallowing impairment*" OR "deglutition disorder*" OR "oropharyngeal dysphagia" OR "oral dysphagia" OR "pharyngeal dysphagia" OR "oral phase" OR "pharyngeal phase" OR "oral transit" OR "pharyngeal transit" OR "swallowing apraxia" OR "delayed swallow*" OR "swallow initiation" OR "oral residue" OR "pharyngeal residue" OR penetration OR aspiration OR "silent aspiration" OR "laryngeal penetration"))

The event/denominator dataset (data.py) and the analysis scripts (ma_core.py: Freeman–Tukey, logit and GLMM random-effects models, prediction intervals, Egger, Begg and trim-and-fill; run_all.py: all reported analyses; plots.py: Figures 2–7 and S1) are provided as a supplementary archive. The scripts reproduce the Stata REML estimates of the submitted analysis exactly (e.g., submitted dataset: pooled prevalence 47.7% [27.2–68.5], τ^2=0.480, I^2=97.58%, Q(10)=373.03; severity OR 5.90 [2.15–16.19], τ^2=1.36, I^2=78.74%).